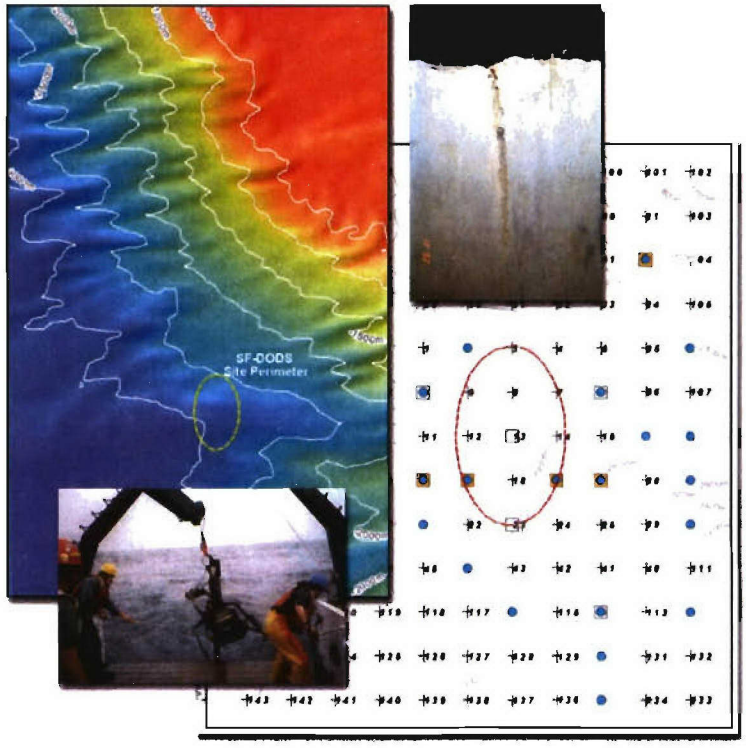
SAN FRANCISCO DEEP OCEAN DREDGED MATERIAL DISPOSAL SITE (SF-DODS) MONITORING PROGRAM

PHYSICAL, CHEMICAL, AND BENTHIC COMMUNITY MONITORING SEPTEMBER 2002



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This report summarizes the analysis of physical, chemical, and benthic communitySeptember 2002 sampling of the San Francisco Deep Ocean Disposal Site. Vertical profile images of the sea floor were taken to measure dredge material deposited within and adjacent to the SF-DODS boundary. Sea floor sediment samples were taken and analyzed for an EPA list of hazardous chemicals. Sea floor samples were also analyzed for benthic community species and compared with species present in baseline benthic community samples taken at SF-DODS prior to dredge material disposal.
Dredge material accumulation for 2002 did not exceed the established threshold of 5 cm outside of the SF-DODS perimeter. Concentrations of screened hazardous chemicals were within acceptable EPA limits for the disposal site. No adverse impacts to the benthic community were detected.

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EXECUTIVE SUMMARY

INTRODUCTION

In September 2002, Science Applications International Corporation (SAIC), in association with ENSR Marine & Coastal Center, conducted the annual physical, chemical, and biological monitoring survey of the San Francisco Deep Ocean Disposal Site (SF-DODS) located approximately 50 nautical miles offshore of San Francisco, California. SAIC and ENSR are subcontractors to Garcia and Associates of San Anselmo, California, the prime contractor to the U.S. Army Corps of Engineers, San Francisco District (USACE).

The USACE and U.S. Environmental Protection Agency, Region IX (U.S. EPA) share responsibility for management and monitoring of the SF-DODS, which is used for the disposal of dredged material from the San Francisco Bay Region. Physical, chemical, and biological monitoring is conducted at the SF-DODS to determine the thickness and extent of dredged material placed at the site and to assess whether adverse physical, chemical, or biological effects are occurring as a result of dredged material placement.
In calendar year 2002, a total of 721,890 cubic yards of dredged material from Richmond Harbor was placed at the SF-DODS. This study was conducted to satisfy environmental monitoring requirements as required by the Ocean Dumping Regulations [40 CFR 228.12 (b)(70)].

Due to difficulties in delineating the perimeter of the annual dredged material deposit during 2002 and distinguishing between the layers deposited in the current year and previous years, this year's survey included benthic infauna community analysis to assess the impact of dredged material disposal at the SF-DODS over multiple years. Benthic infauna community analysis is being conducted to assess whether Tier 1 monitoring threshold (5-centimeter thickness "trigger") requires modification. Benthic infauna samples that were collected and archived during prior monitoring surveys are being analyzed as a companion study under a separate contract administered by the U.S. EPA, Region 9.

SCIENTIFIC PARTY

The scientific party consisted of staff from SAIC offices located in Bothell, Washington; San Diego, California; and Newport, Rhode Island; and staff from ENSR, located in Woods Hole, Massachusetts. Field sampling at the SF-DODS was conducted from September 21 to 27, 2002, aboard the Moss Landing Marine Laboratory research vessel (R/V) *Point Sur*. The R/V *Point Sur* is owned by the National Sciences Foundation and is maintained and operated by San Jose State University. Dr. Scott McDowell of SAIC was

the Chief Scientist during the survey. Mr. Eric Jolliffe of the USACE and Mr. Allan Ota of the U.S. EPA were the government technical representatives.

DATA COLLECTION AND ANALYSIS

Sampling operations consisted of sediment profile imaging (SPI) and box core sediment sampling for sediment chemistry and benthic infauna analysis. The SPI survey grid consisted of 32 stations and was selected to better define the boundary of the dredged material footprint measured during previous monitoring surveys. Analysis of the SPI images was conducted using the REMOTS® (Remote Ecological Monitoring Of The Seafloor) system.

Fifteen box core samples were collected for sediment chemistry and benthic infauna analysis, including one station at the center of the disposal site, three stations on the perimeter of the site, and the remaining stations positioned along depth contours at increasing distances from the center of the site. SPI stations were co-located with all box core stations with the exception of stations 13 and 23.

Sediment samples were analyzed by Columbia Analytical Services, of Kelso, Washington, and analyzed for total volatile solids, total organic carbon, oil and grease/total petroleum hydrocarbons, grain size distribution, metals, polycyclic aromatic hydrocarbons, chlorinated pesticides, and polychlorinated biphenyls. Analytical methodology, quality control, and detection limit requirements followed specifications in the *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual* or "Green Book" (U.S. EPA/USACE, 1991). Benthic samples were sorted into major taxonomic categories by Oceans Taxonomic Services, of Plymouth, Massachusetts, and returned to the ENSR Marine & Coastal Center, of Woods Hole, Massachusetts, for identification and enumeration.

SUMMARY OF MAJOR FINDINGS

Physical, chemical, and benthic community monitoring at the SF-DODS was conducted in September 2002 to fulfill Tier 1 monitoring objectives identified in the Site Management and Monitoring Plan. The SPI survey was conducted to map the dredged material footprint. Sediment chemistry samples were collected from within the dredged material footprint and outside the disposal boundaries and analyzed for the "Green Book" chemicals of concern. In addition, benthic infauna samples were analyzed to assess impacts of dredged material to the benthic community. A summary of major findings is presented below.

The dredged material footprint at the SF-DODS is oriented to the northwest and southeast and centered over the disposal site. The overall footprint is similar to the 2001 footprint. Dredged material observed along the flanks of the deposit appears bioturbated, showing evidence of downward mixing by the benthic infauna community. Due to biological mixing, some uncertainty exists as to the interpretation of dredged material thickness measurements and how recent deposition occurred in those areas. However, of all SPI stations sampled in 2002, only Station 19 located at the perimeter of the SF-DODS showed apparent evidence of recent dredged material deposition. In conformance with current Tier 1 management parameters, deposition of recently placed dredged material (in calendar year 2002) did not exceed 5 cm outside the SF-DODS perimeter.

Conventional sediment chemistry, particularly grain size, total solids, and total organic carbon has been modified at the SF-DODS compared to baseline conditions due to the deposition of dredged material. For contaminant chemistry, cadmium and lead were measured at concentrations above baseline, but were similar to concentrations reported during previous monitoring surveys and dredged material characterizations. PCBs were not detected during the 2002 survey. Contaminants detected during the September 2002 survey did not exceed the maximum concentrations of the dredged material from Richmond or Oakland harbors that were approved for disposal at the SF-DODS.

Benthic infauna samples were collected and analyzed from stations within and outside the dredged material footprint to revisit current Tier 1 management parameters and assess the impact of dredged material disposal at the SF-DODS over multiple years. The benthic community was found to be rich and diverse throughout the SF-DODS area. Stations on the boundary of the disposal site have well-developed and rich benthic communities similar to those located in areas with no evidence of dredged material. Organisms inhabiting disturbed sites within the disposal site boundaries are those species that are normally present; exotic or opportunistic species such as would occur in disturbed shallow-water benthic communities are absent.

Community diversity and density are lowest in the center of the disposal site. However, 57 species were found in one sample from the center of the disposal site and the diversity indices suggested high evenness. Thus, colonization of a disturbed site appears rapid, and the benthic community would likely return to a pre-disposal assemblage if dredged material disposal were terminated.

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LIST OF ACRONYMS

CAS	Columbia Analytical Services, Inc.
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CMDA	Conventional Munitions Disposal Area
CNESS	Chord-Normalized Expected Species Shared
CVAA	Cold Vapor Atomic Absorption Spectrometry
DDD	Dichlorodiphenyl-dichloroethane
DDE	Dichlorodiphenyl-dichloroethylene
DDT	Dichlorodiphenyl-trichloroethane
DGPS	Differential Global Positioning System
DRO	Diesel Range Organics
ECD	Electron Capture Detection
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESS	Expected Species Shared
GC	Gas Chromatograph
GFAA	Graphite Furnace Atomic Absorption Spectrometry
GIS	Geographic Information System
H'	Shannon-Wiener Diversity Index
HB	Billouin Diversity Index
HPAH	High Molecular Polycyclic Aromatic Hydrocarbons
HPLC	High Performance Liquid Chromatography
ICP	Inductively Coupled Plasma Emission Spectroscopy
J'	Pielou's Evenness Index
LPAH	Low Molecular Polycyclic Aromatic Hydrocarbons
LTMS	Long-Term Management Strategy
MDL	Method Detection Limit
MPRSA	Marine Protection Research and Sanctuaries Act of 1972
MRL	Method Reporting Limit
MS	Mass Spectrometry
NAD83	North American Datum of 1983
NDD	Non-Dimensional Diversity
NESS	Normalized Expected Species Shared
ODMDS	Ocean Dredged Material Disposal Site
OSI	Organism-Sediment Index
PAH	Polycyclic Aromatic Hydrocarbons
PCA-H	Principal Components Analysis of Hypergeometric Probabilities
PCB	Polychlorinated Biphenyls
PRC	PRC Environmental Management, Inc.
QA	Quality Assurance
QC	Quality Control
REMOTS®	Remote Ecological Monitoring of the Seafloor
RPD	Redox Potential Discontinuity
RRO	Residual Range Organics
R/V	Research Vessel

LIST OF ACRONYMS (Continued)

SAIC	Science Applications International Corporation
SVOC	Semi-Volatile Organic Compounds
SD	Standard Deviation
SF-DODS	San Francisco Deep Ocean Disposal Site
SMMP	Site Management and Monitoring Plan
SPI	Sediment Profile Imaging
TBT	Tri-Butyltin
TOC	Total Organic Carbon
TPCB	Total Polychlorinated Biphenyls
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
V	Evenness Value for HB
WHOI	Woods Hole Oceanographic Institute

1.0 INTRODUCTION

The U.S. Army Corps of Engineers, San Francisco District (USACE) and the U.S. Environmental Protection Agency, Region IX (U.S. EPA) share responsibility for management and monitoring of the San Francisco Deep Ocean Disposal Site (SF-DODS), which is used for the disposal of dredged material from the San Francisco Bay Region. Located approximately 50 nautical miles offshore of San Francisco, the SF-DODS is centered at 37° 39.0'N, 123° 29.0'W and occupies an area of 6.5 square nautical miles (Figure 1-1). The site is on the continental slope west of the Farallon Islands, with water depths ranging from 2,700 to 3,100 meters.

Dredged material placement at the SF-DODS first occurred in the calendar year 1995. Use of the SF-DODS for dredged material disposal was dependent on the implementation of a Site Management and Monitoring Plan (SMMP; U.S. EPA, 1994), which has since been incorporated into a SMMP Implementation Manual by the U.S. EPA (1998). Physical, chemical, and biological monitoring is conducted on an annual basis at the SF-DODS to determine the thickness and extent of dredged material placed at the site and assess whether adverse physical, chemical, or biological effects are occurring as a result of dredged material placement.

This report presents the results of the physical, chemical, and benthic community monitoring conducted at the SF-DODS in September 2002. This study was conducted to satisfy environmental monitoring requirements following disposal of 721,890 cubic yards of dredged material at the SF-DODS during the 2002 calendar year. In addition to physical and chemical monitoring, benthic community analysis was conducted in order to address difficulties in delineating the perimeter of annual dredged material deposits in 2002, distinguishing between layers deposited in 2002 and those layers deposited in previous years, and to assess any impacts from the apparent accumulation of dredged material over multiple years. This report includes benthic community analysis results for the SF-DODS in September 2002. Archived benthic infauna samples from prior monitoring surveys are being analyzed as a companion study under a separate contract administered by the U.S. EPA, Region 9.

Science Applications International Corporation (SAIC), of Bothell, Washington conducted the 2002 study in association with ENSR, of Woods Hole, Massachusetts. SAIC and ENSR are subcontractors to Garcia and Associates of San Anselmo, California, the prime contractor to the USACE, San Francisco District. Garcia and Associates has provided Quality Assurance/Quality Control (QA/QC) and technical editing, along with overall project oversight.

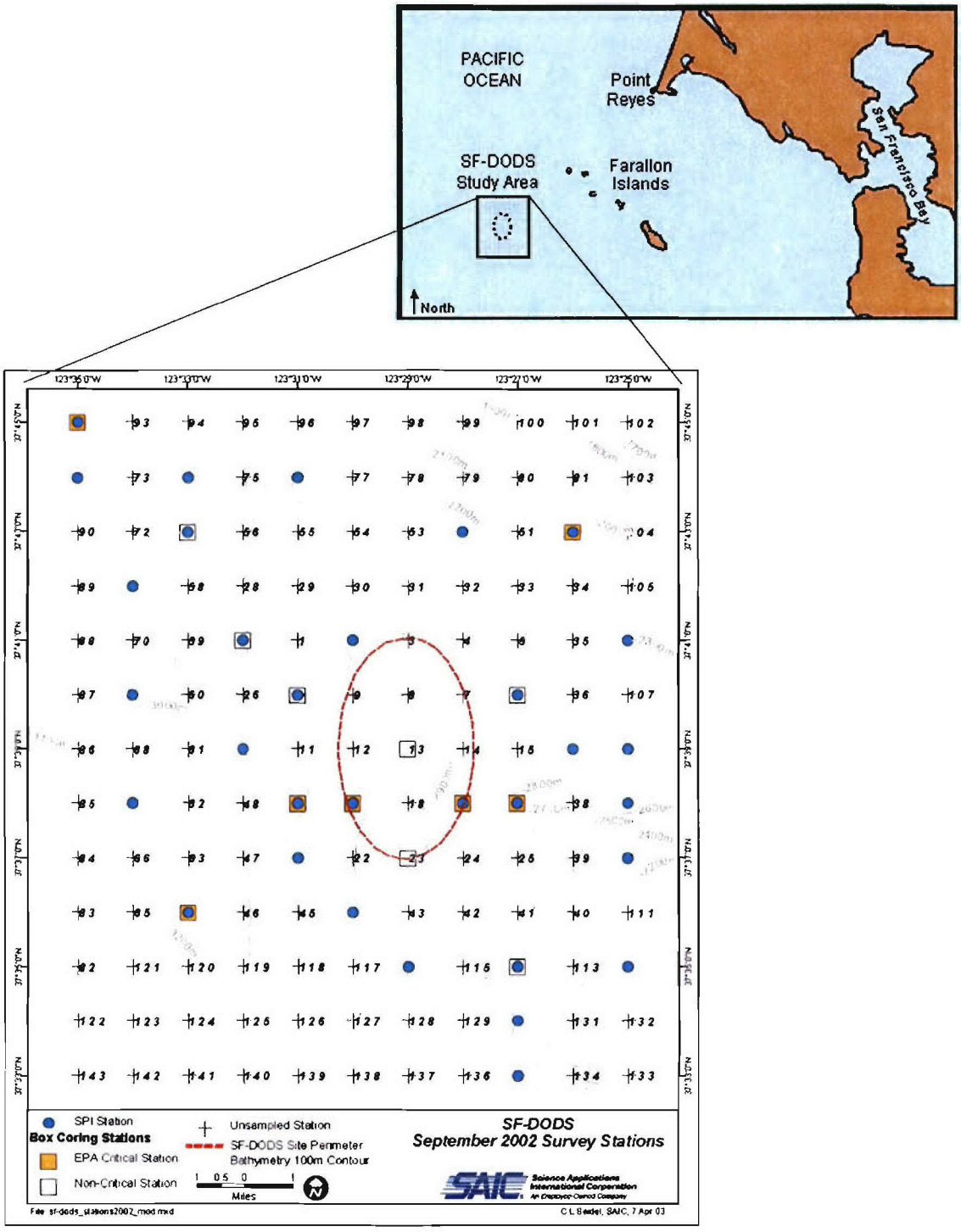


Figure 1-1. Location of the San Francisco deep ocean dredged material disposal site (SF-DODS) and example survey grid.

2.0 MONITORING OBJECTIVES

The SF-DODS SMMP implementation manual identifies a three-tiered approach to environmental monitoring of the SF-DODS (U.S. EPA, 1998). Each tier of the program addresses physical, chemical, and biological parameters. Monitoring activities conducted in September 2002 were used to address Tier 1 physical, biological, and chemical monitoring. In addition, benthic community analysis was conducted on the September 2002 infauna samples at the request of the U.S. EPA, Region 9 due to difficulties in delineating the perimeter of the dredged material deposit in 2002, distinguishing between layers deposited in 2002 and those layers deposited in previous years, and to assess any impacts from an apparent accumulation of dredged material over multiple years. In some locations outside of the SF-DODS boundaries, the cumulative deposits over multiple years exceed the 5-centimeter monitoring threshold (see Section 2.2). The benthic community analysis conforms to Tier 2 specifications, but was not formally triggered because dredged material accumulation greater than five centimeters did not occur in one year. Benthic community analysis included samples collected during the September 2002 survey as well as archived benthic infauna samples from previous monitoring surveys. Results for the archived benthic analysis are not included in this report.

Higher tier monitoring (Tiers 2 and 3) is evaluated under a case-by-case basis and is initiated under U.S. EPA and USACE direction as a management action or specific site study. A brief summary of Tier 2 and Tier 3 monitoring objectives is provided in Section 2.3. Detailed descriptions can be found in the SMMP (U.S. EPA, 1994) and its implementation manual (U.S. EPA, 1998).

2.1 Tier 1 Monitoring

Under the requirements of the Final Rule, Tier 1 monitoring is implemented during each calendar year in which disposal activity has occurred. Tier 1 objectives are structured according to the following parameters:

- **Physical monitoring.** Tier 1 physical monitoring is used to map the distribution and thickness of dredged material placed at the SF-DODS and to determine whether any dredged material has been deposited outside of the disposal site. Sediment Profile Imaging (SPI) photography is used to accomplish this objective. Significant dredged material accumulation is defined in the SMMP as

material accumulated on the ocean bottom to a thickness of five centimeters or greater in one calendar year.

- **Chemical monitoring.** Tier 1 chemical monitoring consists of the collection and analysis of sediment samples both within and outside the dredged material footprint. The chemical analyses follow procedures described in the *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual* (U.S. EPA/USACE, 1991) (commonly referred to as the "Green Book"). Chemical analysis of sediments within and outside the dredged material footprint is conducted to allow comparisons of chemical concentrations between ambient conditions and areas affected by dredged material disposal. Chemical analysis is also a confirmation of project pre-disposal sediment testing.

- **Biological monitoring.** Under Tier 1 biological monitoring, benthic infaunal samples are collected using a boxcore sampler and preserved. Identification and enumeration of the samples occurs only if required under the Tier 2 monitoring program. Tier 1 biological monitoring also includes monitoring of pelagic communities. Pelagic community monitoring consists of regional surveys of seabirds, marine mammals and mid-water column fish populations, which might be affected by water column plumes resulting from dredged material disposal at the SF-DODS. Monitoring is conducted three times annually and periodically from vessels involved in dredged material disposal operations at the SF-DODS. Pelagic community monitoring was not addressed as part of this field program and is not included in this report.

2.2 Benthic Infauna Analysis Objectives

Recent SPI survey results at the SF-DODS have suggested that Tier 1 thresholds for dredged material accumulation should be revisited due to ambiguities in the interpretation of the depth of dredged material found outside the disposal site boundary. Following the years when large volumes of dredged material were deposited, the layers of dredged material detected during the surveys for some stations outside of the SF-DODS boundaries were equal to or exceeded the 5-centimeter threshold. However, it became increasingly difficult to distinguish between the new dredged material and old dredged material deposited in prior years. This identification is especially difficult in those years when the amount of material disposed of at the site is low.

The U.S. EPA has agreed to revisit the monitoring strategy and therefore has requested that the biology samples be processed in conformance with Tier 2 specifications, although Tier 2 is not formally triggered because dredged material accumulation greater than five centimeters did not occur in one year. The purpose of this effort is to determine in as much detail as possible the impacts of dredged material disposal on the benthic infauna. To this end, this report presents results of the analysis of 15 infauna box core samples collected in September 2002. Additional samples from prior years are being processed as part of a companion study contracted with U.S. EPA Region IX.

In order to evaluate the potential impacts of dredged material disposal on benthic organisms, the sampling design for September 2002 included stations within, on the boundary of, and adjacent to the disposal site. In addition, reference stations were selected from areas having light to moderate amounts of dredged material as well as sites that clearly consisted of pristine native sediment.

The results of two baseline surveys provide a detailed look at the benthic communities as they existed in 1990 and 1991 prior to the site designation (SAIC, 1991, 1992a; Blake et al., 1992). From this baseline, broad patterns of faunal zonation in terms of indicator species were evaluated. One objective of the analysis of the monitoring samples is to determine whether the disposal program has altered these patterns. From sediment profile image results of recent monitoring surveys, it is apparent that benthic organisms in areas of light to moderate accumulations of dredged material appear to be producing distinct burrows and other evidence of active bioturbation. However, there is no information on the species composition of these sites and whether the fauna currently resident include the same species as were found in the baseline surveys. Analysis of these data permits these issues to be addressed. To this end, all of the statistical methods currently used in benthic community analysis to estimate species diversity, species richness, and community structure have been applied.

2.3 Criteria for Implementing Tiers 2 and 3

The implementation of Tiers 2 and 3 is dependent upon criteria outlined in the SMMP (U.S. EPA, 1994) and its implementation manual (U.S. EPA, 1998). The criteria are based on significant physical, chemical, and/or biological effects, which are summarized below.

- **Physical monitoring.** Tier 2 physical monitoring may be implemented when Tier 1 monitoring determines that a significant amount of dredged material (>5cm accumulating in any one year) has

been deposited or transported outside of the SF-DODS boundaries, and when it is determined that management actions may not be effective. Under Tier 2 physical monitoring, oceanographic studies would be conducted to validate and/or improve models used to predict dredged material deposition and dispersion. Appropriate physical oceanographic studies would include collection of current meter, sediment trap, and surface and subsurface drifter data. Under Tier 3, physical monitoring would include advanced oceanographic modeling, consisting of Tier 2 elements as well as more advanced sampling methods or equipment.

- **Chemical monitoring.** Tier 2 chemical monitoring is implemented when physical monitoring indicates significant dredged material accumulations offsite during any one year, and when Tier 1 chemical monitoring is insufficient to determine whether dredged material placed at the disposal site contains levels of chemical contaminants that are not significantly elevated over screening levels pursuant to 40 CFR part 227. Archived sediment chemistry samples from outside of the dredged material footprint and outside of the disposal site boundaries are analyzed. Tier 3 chemical monitoring is conducted if Tier 2 chemical monitoring is insufficient to determine whether dredged material placed at the disposal site contains levels of chemical contaminants that are not significantly elevated over screening levels pursuant to 40 CFR part 227. Tier 3 chemical monitoring consists of tissue analysis of benthic and epifaunal organisms to determine bioaccumulation of contaminants related to dredged material placement at the SF-DODS.

- **Biological monitoring.** Tier 2 analysis of benthic communities is performed if physical monitoring indicates significant dredged material deposition outside of the SF-DODS boundaries in one calendar year. Tier 2 consists of identification and enumeration of the archived benthic infauna samples collected in Tier 1. Tier 2 pelagic community monitoring is implemented when Tier 1 is unable to establish whether dredged material placed at the SF-DODS has endangered the monitored pelagic communities. Tier 2 pelagic monitoring consists of supplemental and more intensive pelagic community surveys (e.g., seabirds, marine mammals, mid-water column fish) similar to Tier 1. When Tier 2 pelagic community monitoring is insufficient to make reasonable conclusions as to whether disposal at the SF-DODS has endangered the monitored pelagic communities, Tier 3 monitoring of pelagic communities (advanced surveys) is employed. If chemical monitoring indicates significant bioaccumulation of contaminants in organisms sampled from within or outside the dredged material footprint, Tier 3 biological monitoring is implemented (bioaccumulation sampling of benthic and/or epifaunal organisms). Tier 3 biological monitoring may replace Tier 3

chemical monitoring if observed biological effects are established as surrogate indicators for bioaccumulation of chemical contaminants in sampled organisms.

3.0 BACKGROUND

3.1 Regulatory History

In 1990, a partnership was developed between several government agencies and representatives from ports, fishermen's organizations, environmental groups, and business interests to develop a long-term management strategy (LTMS) for dredged material in the San Francisco Bay Area for the next 50 years. The LTMS agencies have jointly published a Policy Environmental Impact Statement/Programmatic Environmental Impact Report (EIS/EIR) to evaluate alternative approaches for long-term dredged material management. Under this strategy, clean dredged material is viewed, whenever possible, as a resource rather than as a waste material. The goal is to use approximately 40% of this material for upland/wetland reuse, including restoration of tidal wetlands; an additional 40% is to be disposed of at the SF-DODS; and the remaining 20% is to be deposited at existing disposal sites in the Bay.

The location of the SF-DODS is the environmentally preferred alternative for a deep ocean dredged material disposal site, as determined in the *Final Environmental Impact Statement for Designation of a Deep Water Ocean Dredged Material Disposal Site off San Francisco, California* (U.S. EPA, 1993). The SF-DODS meets the general and site-specific criteria listed in 40 CFR 228.5 and 228.6(a) of the EPA Ocean Dumping Regulations for open water disposal sites.

Use of the SF-DODS for dredged material disposal was dependent on the implementation of the SMMP (U.S. EPA, 1994). The general SMMP environmental monitoring requirements are presented in the Final Rule [as incorporated into 40 CFR 228.12 (b)(70)] and further defined in two working documents developed by the Corps and EPA, the Draft SF-DODS Site Management and Monitoring Plan (issued as a Public Notice, April 1996) and the Draft SF-DODS Site Monitoring Plan. EPA has incorporated these documents into the SMMP Implementation Manual (U.S. EPA, 1998). This tiered physical, chemical, and biological monitoring plan is implemented annually (see Section 2.0, Tier 1) and consists of three major components: periodic, regional/seasonal, and confirmatory monitoring. The periodic monitoring is focused on documentation of seabird and marine mammal presence and feeding activities in the vicinity of the scow during transit to the disposal site and during disposal at the site. Regional or seasonal monitoring is designed to identify physical, chemical, and biological impacts at the site due to disposal of dredged material. Confirmatory monitoring is required once every three years per the Final Rule, as an additional test of sediment quality and possible long-term bioaccumulation of contaminants.

3.2 Historical Use of Deep Water Site

The SF-DODS is located in an area of historical ocean disposal (Figure 3-1). The boundaries of the SF-DODS were established within Study Area 5, the preferred alternative for an ocean disposal site as identified in the site designation EIS (U.S. EPA, 1993). Study Area 5 and surrounding areas have historically been used as a chemical and conventional munitions disposal area (CMDA), and as a depository for low-level radioactive waste. From 1951 through 1954, the general Study Area 5 region, particularly the southeast area, received sealed containers of low-level radioactive wastes from defense-related, commercial, and laboratory activities. From approximately 1958 to the late 1960's, the U.S. Navy disposed of chemical and conventional munitions in the northern portion of the study area.

3.2.1 U.S. Navy Section 103 Ocean Disposal Site Designation

In August 1990 and July 1991, an environmental investigation was conducted at the CMDA for the U.S. Navy as part of the Marine Protection Research and Sanctuaries Act of 1972 (MPRSA) Section 103 ocean dredged material disposal site (ODMDS) designation process (SAIC, 1991; 1992a). The SF-DODS is located in the southwest corner of the CMDA (Figure 3-1). The U.S. Navy had applied for a Section 103 ocean disposal permit to dispose of dredged material from the Alameda Naval Air Station and Oakland Naval Supply Center Base. The baseline investigations conducted at the CMDA determined that:

- Sediments did not contain elevated levels of organic chemical contaminants, with the exception of pyrene during the 1990 survey (SAIC, 1991), and toxaphene and the PCB Aroclor 1221, during the 1991 survey (SAIC, 1992a).
- Metal concentrations were within the range considered normal for deep-sea sediments.
- The southwest corner of the CMDA was identified as the best location for the U.S. Navy 103 ODMDS (Figure 3-1). The Navy ODMDS is located within the SF-DODS.

3.2.2 1993 Midpoint Monitoring at the ODMDS

Following approval of the Section 103 ocean disposal permit, the U.S. Navy placed approximately 1.2 million cubic yards of dredged material at the ODMDS between May and December 1993. In September 1993, the U.S. Navy conducted midpoint SPI monitoring at the ODMDS to assess the dispersion of

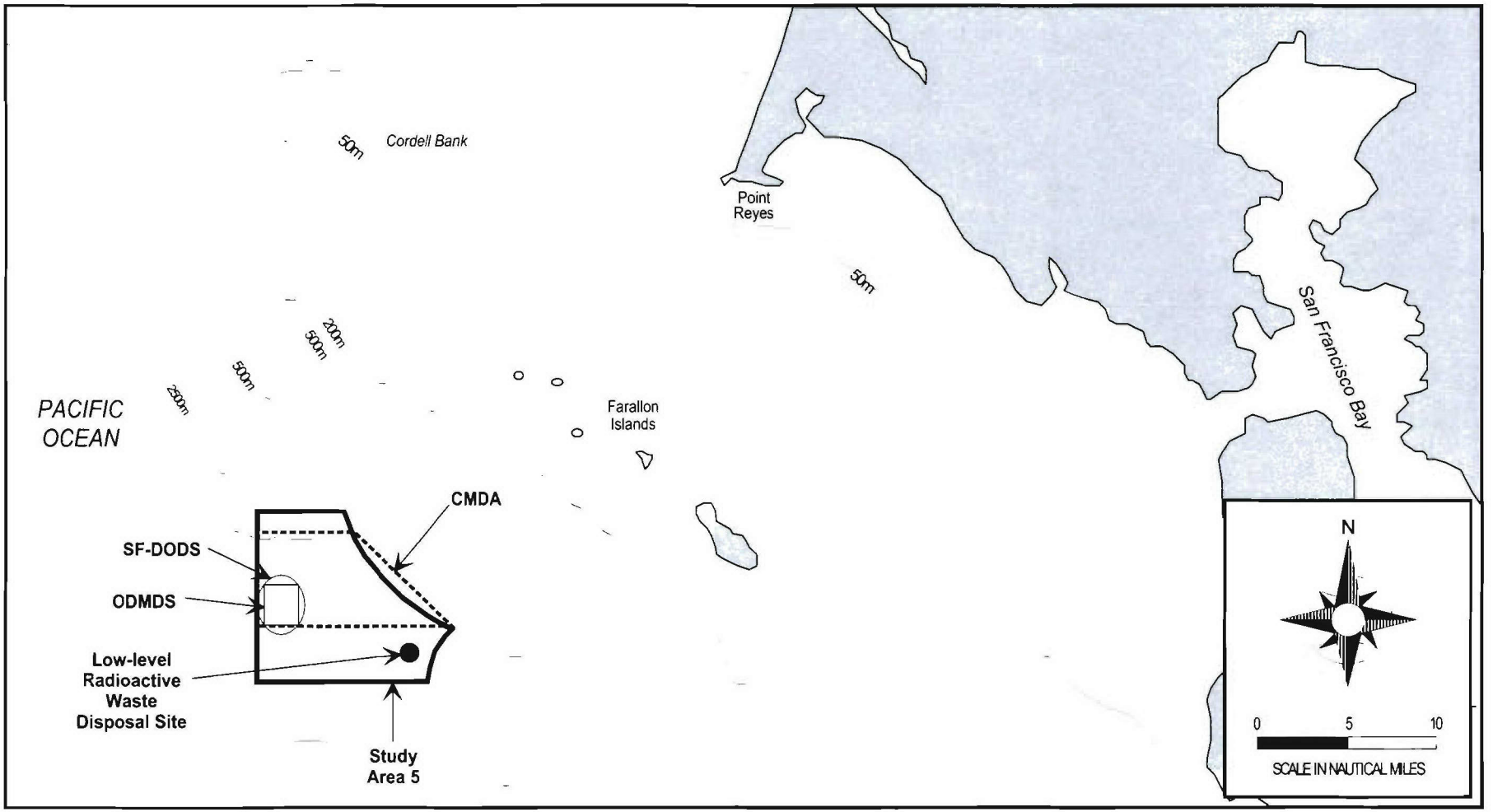


Figure 3-1. Location of previously used ocean waste disposal sites within proximity of the SF-DODS.

sediment in the water column and deposition of sediment on the seafloor resulting from dredged material disposal (PRC, 1995). The following conclusions were reached:

- SPI mapping of the dredged material footprint (location and thickness) matched reasonably well with modeled dispersion patterns, including the spread of material along the north-northwest axis.
- Impacts to the benthic community were less than anticipated.
- SPI images collected during this survey already showed evidence of mixing and recolonization of dredged material deposited on the seafloor.

3.3 SF-DODS Environmental Monitoring Program

Dredged material disposal at the designated SF-DODS site began in the fall of 1995 following the implementation of the SMMP (U.S. EPA, 1994). Since that time, dredged material disposed at the SF-DODS has consisted of material from the Inner and Outer Oakland Harbor, and Richmond Harbor (Figure 3-2). Prior to this survey, seven annual environmental monitoring studies of the SF-DODS have occurred:

1. January 1996 SAIC
2. December 1996 SAIC
3. October 1997 SAIC
4. October 1998 Tetra Tech
5. October 1999 Tetra Tech
6. October 2000 Tetra Tech
7. October 2001 Tetra Tech

The studies consisted of annual Tier 1 physical, chemical, and benthic community monitoring at the SF-DODS following dredged material disposal, in accordance with the SMMP. The U.S. EPA and USACE determined that Tier 2 and 3 environmental monitoring was not warranted following each annual Tier 1 survey. Results and conclusions for each monitoring survey are summarized below in Table 3-1.

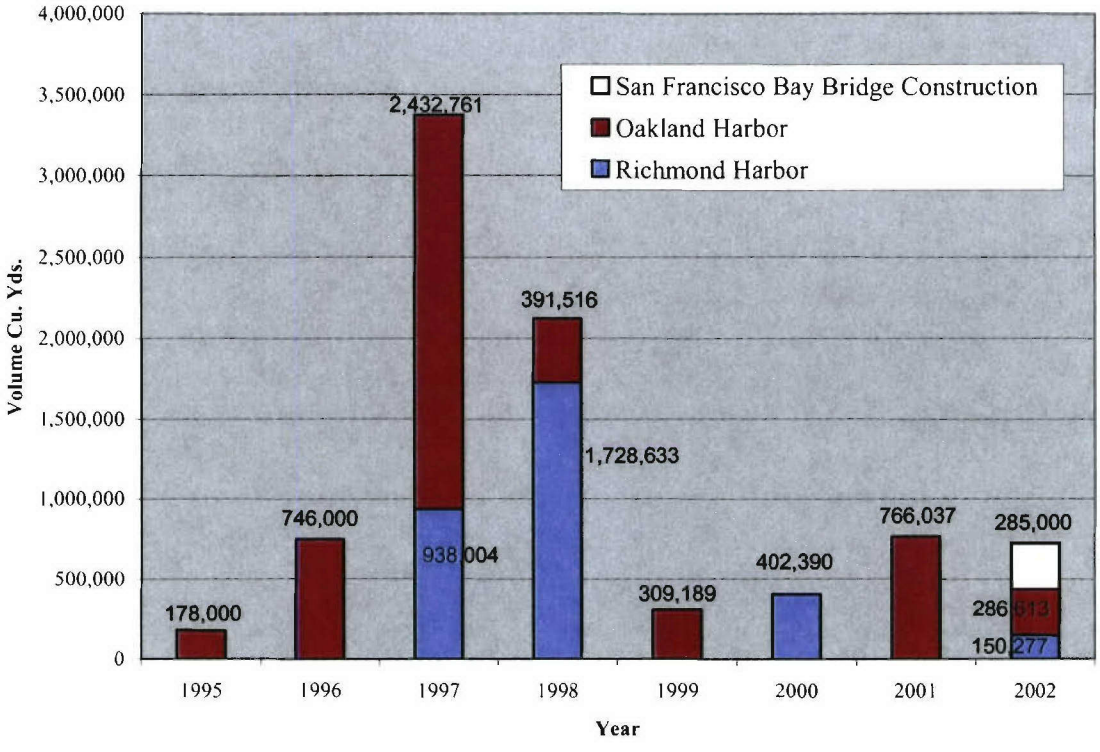


Figure 3-2. Volume and source of dredged material at SF-DODS, 1995 -2002.

Table 3-1. Summary of SF-DODS Tier 1 environmental monitoring results 1996 – 2001.

			PHYSICAL MONITORING			CHEMICAL MONITORING		BIOLOGICAL MONITORING		
Monitoring Event	Date	Contractor	Dredged material outside perimeter?	Annual 5 cm threshold exceeded?	Action	Elevated chemical concentrations detected?	Action	Benthic Infauna Samples Collected?	Action	Tier 2 or 3 monitoring indicated?
1	Jan-96	SAIC	Yes	No	None required	No	None required	Yes	None required	No
2	Dec-96	SAIC	Yes	No	None required	Yes	Silver and selenium elevated onsite. However, most chemicals below dredged material characterization levels. No action required.	Yes	None required	No
3	Oct-97	SAIC	Yes	No	None required	Yes	Levels are below dredged material characterization levels. No action required.	Yes	None required	No
4	Oct-98	Tetra Tech	Yes	No	Due to wider dredged material dispersal, survey focus is footprint perimeter delineation.	Yes	Selenium elevated relative to dredged material characterization levels. No action required.	Yes	None required	No
5	Oct-99	Tetra Tech	Yes	No	None required	Yes	Selenium elevated relative to dredged material characterization levels. No action required.	Yes	None required	No
6	Oct-00	Tetra Tech	Yes	Yes	Nearly 10 cm of dredged material at Station 16. Increased SPI sampling density proposed in 2001.	Yes	Selenium elevated relative to dredged material characterization levels. No action required.	Yes	None required, per 2001 confirmatory SPI measurements.	No, per 2001 confirmatory SPI measurements.
7	Oct-01	Tetra Tech	Yes	No	None required	Yes	Silver and selenium elevated onsite. However, most chemicals below dredged material characterization levels. No action required.	Yes	None required	No. SPI testing at Station 16 suggests isolated "short" dumping.

4.0 METHODS

This section describes the field methods used in the collection of physical, chemical, and biological samples, and the analytical methods used in the analysis of the collected samples during the September 2002 environmental monitoring of the SF-DODS.

4.1 Field Methods

Field sampling at the SF-DODS was conducted from September 21 through September 27, 2002, aboard the Moss Landing Marine Laboratory's 135-foot research vessel (R/V) *Point Sur*. A summary of field sampling operations is provided in the Post-Cruise Summary Report (SAIC, 2002). A total of 32 stations were sampled using Sediment Profile Imagery (SPI) photography and 15 stations were sampled using a box core sampler for benthic infauna and sediment chemistry analysis (Figure 4-1). Stations deemed critical for sampling by the U.S. EPA were occupied and the total number of stations for SPI and box core collections exceeded the minimum project requirements (30 SPI stations and 13 box core stations). Coordinates for the actual sampling locations are listed in Appendix A.

SPI photography stations were targeted to improve the boundaries of the dredged material footprint identified during previous environmental monitoring surveys (Tetra Tech, 2001; 2002). In addition to occupying stations sampled during previous monitoring events, seven new stations (stations 50, 64, 67, 69, 106, 130 and 135) were sampled to help define the boundary of the dredged material deposit. Based on the historical dredged material footprint at the SF-DODS, four box core stations were sampled outside of the footprint and eleven box core stations were sampled where dredged material was known to be present.

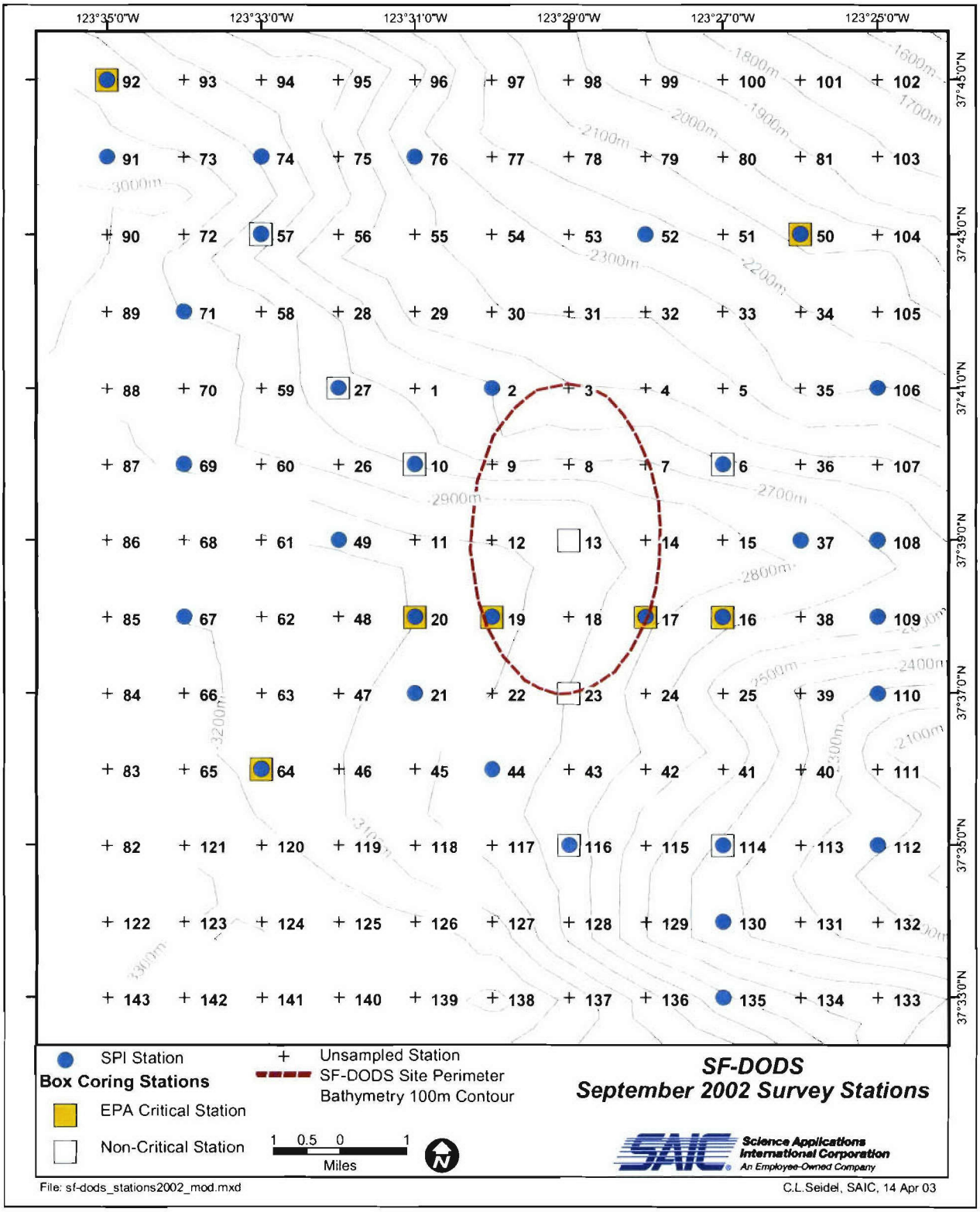


Figure 4-1. Box core and SPI photography stations sampled during the September 2002 survey of the SF-DODS.

4.1.1 Navigation

The R/V *Point Sur* was positioned using the ship's differential global positioning system (DGPS), which provides horizontal positional accuracy of ± 2 to 10 meters. Vessel positions are reported as latitude and longitude, North American Datum 1983 (NAD83). A summary of station locations and water depths for all SPI and box core samples collected is provided in Appendix A. Due to the water depth at the SF-DODS site (approximately 3000 meters), the position of the sampling equipment on the seafloor can be laterally offset due to angles in the hydrowire. To minimize this offset, the angle of the hydrowire was never more than 5 degrees from the vertical before reaching the seafloor. Thus, the position of the sampling equipment was equal to or less than 250 meters from the DGPS-recorded vessel position.

4.1.2 SPI Photography

A total of 153 SPI photographic images were collected at 32 stations during the September 2002 SF-DODS survey. Five replicate images were attempted at each station using a Benthos model 3731 sediment-profile camera (Benthos, Inc., North Falmouth, MA) (Figure 4-2). Color slide film (Ektachrome ASA 100) was used for all photographs and developed onboard the vessel to verify successful image acquisition. The camera is designed to obtain *in situ* profile images of the top 20 cm of sediment. Functioning like an inverted periscope, the camera consists of a wedge-shaped prism with a front faceplate and a back mirror mounted at a 45° angle to reflect the profile of the sediment-water interface facing the camera. The prism is filled with distilled water, the assembly contains an internal strobe used to illuminate images, and a 35-mm camera is mounted horizontally on top of the prism. The prism assembly is moved up and down into the sediments by producing tension or slack on the winch wire. Tension on the wire keeps the prism in the "up" position.

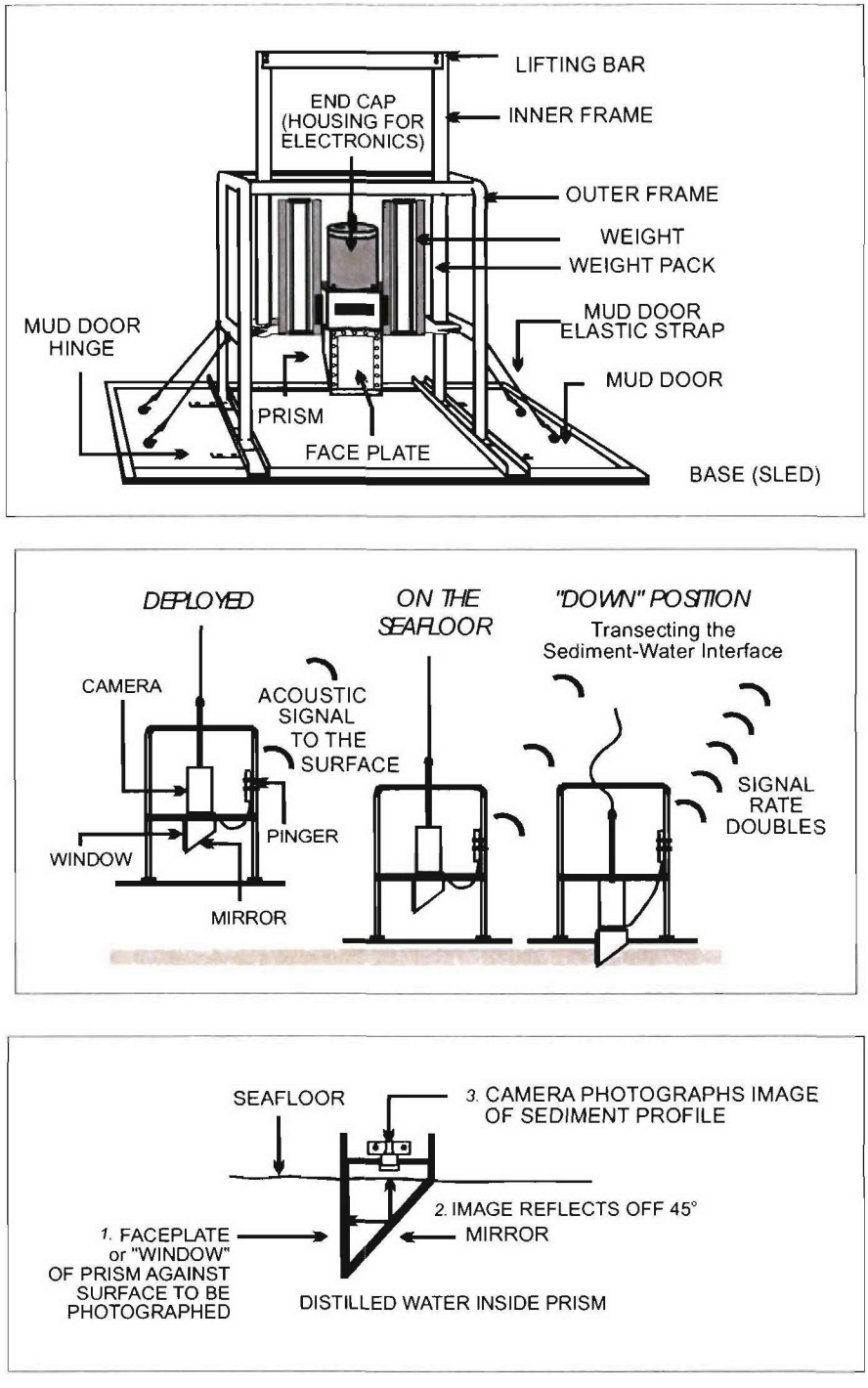


Figure 4-2. Schematic diagram of Benthos, Inc., Model 3731 REMOTS® sediment-profile camera and sequence of operation on deployment.

When the camera reaches the seafloor, slack on the winch wire allows the prism to penetrate the seafloor vertically. A passive hydraulic piston ensures that the prism enters the bottom slowly (approximately 6 cm/sec) and does not disturb the sediment-water interface. As the prism starts to penetrate the seafloor, a trigger activates a 13-second time delay on the shutter release to allow maximum penetration before a photo is taken. A Benthos Model 2216 Deep Sea Pinger is attached to the camera and outputs a constant 12 kHz signal of one ping per second; upon discharge of the camera strobe, the ping rate doubles for 10 seconds. Monitoring the signal output on the R/V *Point Sur* provides confirmation that a successful image was obtained. Because the sediment photographed is directly against the faceplate, turbidity of the ambient sweater does not affect image quality. When the camera is raised, a wiper blade cleans off the faceplate, the film is advanced by a motor drive, the strobe is recharged, and the camera can be lowered to take another image.

4.1.3 Box Core Sampling

Fifteen SF-DODS stations were sampled using a 0.25 m^2 Sandia MK-III box corer (Figure 4-3) for sediment chemistry analysis and benthic infauna collections. All box cores were processed for both chemistry and benthos. The box core is partitioned into 25 aluminum subcores, each with a surface area of 0.01 m^2 (10 cm x 10 cm) and a length of 30 cm. A pinger attached to piston of the box core was used to acoustically track the box core to the bottom. A shift in the pinger rate indicated the tripping of the box core on the bottom, and the pullout weight measured from the cable tensiometer was used as a measure for successful sample acquisition.

Sediments collected from each station were screened for radiation once the box corer was brought on deck. Radiation measurements were made using a Geiger-Mueller meter and "pancake" probe, which measures Alpha, Beta, and Gamma radiation in counts per minute. These measurements were compared to background readings taken before the sampling equipment was brought on deck. Throughout the cruise, no radiation levels were found above background levels.

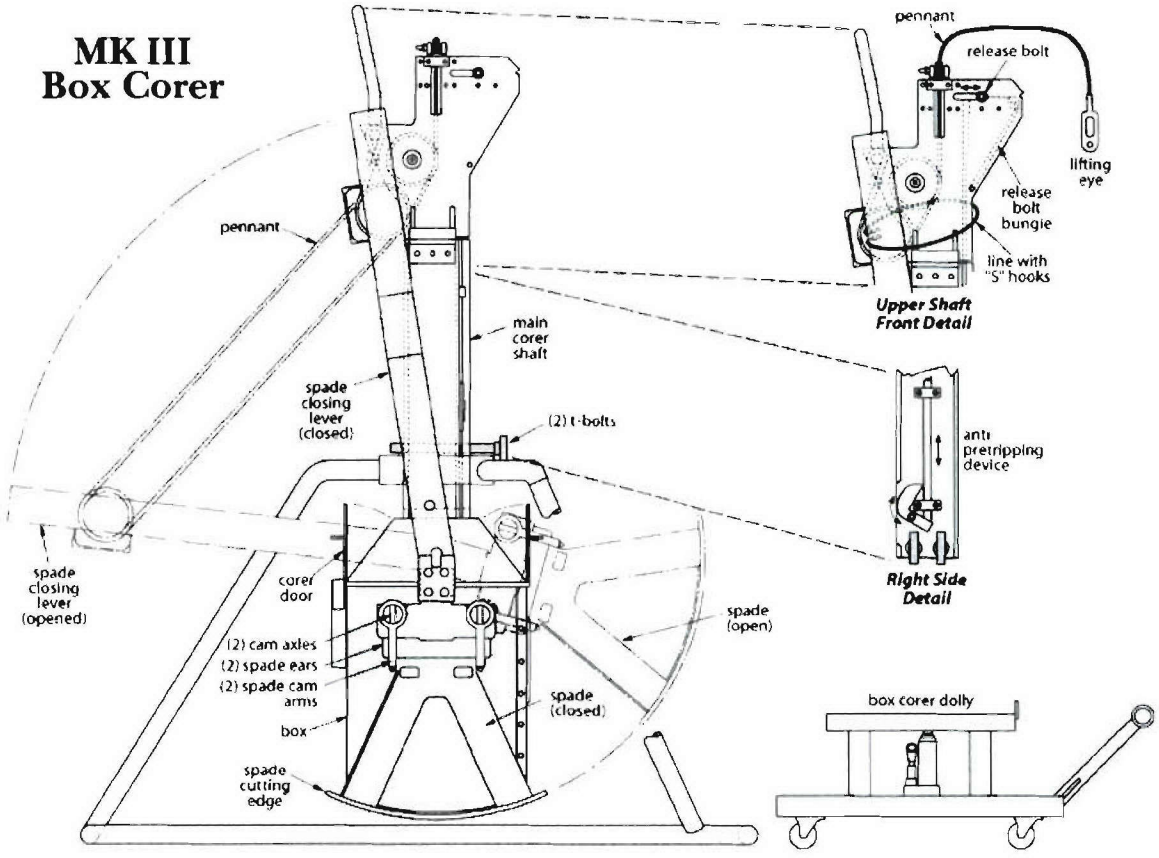


Figure 4-3. Sandia MK-III box core schematic (WHOI, 2003).

Sediment Chemistry

After retrieval of the box core, five subcores were removed from each core for sediment chemistry. Each subcore was placed on top of a wooden extruding post with the same dimensions as the inside of each subcore (10 cm x 10 cm). The overlying water was carefully siphoned off without disturbing the surface sediment, and the sediment inside the subcore was then extruded by pushing the subcore down over the wooden post. The top 10 cm of the subcore was removed by slicing the sediment with a pre-cleaned stainless steel cutting blade. The top 10 cm of the five subcores were transferred to a pre-cleaned stainless steel bowl and composited. The sample was homogenized as determined visually by texture and color, and then placed into sample jars for the appropriate analyses. Visual descriptions of each composite sample, including color, odor, texture, and debris can be found in the field log (SAIC, 2002) and are summarized in Appendix A. All chemistry sample jars were frozen at -20°C, except for the grain size analysis sample jars, which were maintained at 4°C. Chain-of-custody procedures were followed in the transfer of samples to the analytical laboratory. Chain-of-custody forms are provided in Appendix B.

A portion of the each composite sample was field tested for grain size using wet sieve analysis. The analysis was conducted by taking a 100 ml aliquot of sediment and washing the material through a #230 sieve (63 µm mesh). The grain size transition between sand and silt is 63 µm. The material remaining in the sieve is measured and represents the amount of sand in the sediment (e.g., if 30 ml of sand is measured, the sediment sample contains approximately 30% sand). Results of the wet sieve analyses are provided in the field log (SAIC, 2002).

All stainless steel bowls and utensils used for sediment sample processing were pre-cleaned to prevent contamination of samples. All compositing equipment was scrubbed using Alconox and water, followed by successive rinses of the following: tap water, distilled water, methanol, and distilled water. After cleaning, all sampling bowls and utensils were foil wrapped until needed for sample processing.

Benthic Infauna Collections

After retrieval of the box core, the entire surface of the sample was examined. Evidence of disturbance, sediment color, and any interesting or unusual biological or physical features were noted in the field log (SAIC, 2002). The 0.01 m^2 subcores for benthic infauna samples were removed individually from the sample box and placed on top of a wooden extruding post that exactly fit the inside dimensions of the

subcores (10 x 10 cm). Ten subcores were extruded at each station. The water overlying the sediment was siphoned or poured into a 300-µm sieve to avoid the loss of any small crustaceans that live in the sediment-water interface. At this point, a specially designed PVC core cutter that fits precisely over the top of the core tube was fitted. The sediment inside the subcore was extruded by pushing the core cutter and subcore down over the wooden post. The top 10 cm of the subcore was removed by slicing the sediment with a stainless steel cutting blade at the bottom of the core cutter. The sediment in the core cutter was then carried to a sieving table. In some cases, the upper flocculent portion was rinsed directly into a prelabeled 32-oz plastic jar and preserved in 10% buffered formalin. This procedure avoided excess damage to the delicate organisms that live in the top 2 to 3 cm. The lower compacted portion was then gently washed through the 300-µm sieve and preserved in another 32-oz jar in 10% buffered formalin. For samples where the dredged material was heavy and there was no flocculent layer, all of the sediment was sieved.

Samples were retained in formalin until they were received at the ENSR Marine & Coastal Center in Woods Hole, MA. In the past, samples have been transferred to alcohol at sea in order to avoid decalcification of certain organisms. However, regulation pertaining to shipments of hazardous materials now precludes trans-continental shipments of specimens in large volumes of alcohol. Samples were transferred to 80% ethyl alchohol soon after arrival in Woods Hole.

4.2 Laboratory Methods and Data Analysis

This section describes the analysis methods used during the physical, chemical, and biological monitoring of the SF-DODS in September 2002. Physical monitoring consisted of the collection of SPI images, chemical monitoring consisted of sediment chemistry analysis, and biological monitoring consisted of benthic infauna identification and enumeration.

4.2.1 SPI Image Analysis

Analysis of the SPI images was conducted using the REMOTS® (Remote Ecological Monitoring Of The Seafloor) system. REMOTS® is a formal and standardized technique for SPI image acquisition, analysis, and interpretation originally developed by SAIC scientists (Rhoads and Germano, 1982 and 1986; SAIC, 1985). Following completion of the SF-DODS survey, the color slides (SPI images) were digitized and a computer-based image analysis system was used to measure the following parameters:

- Presence of dredged material
- Sediment grain size (major mode and range)
- Optical prism penetration depth
- Surface boundary roughness
- Mud clasts
- Apparent Redox Potential Discontinuity (RPD) depth
- Infaunal successional stage
- Calculation of the organism-sediment index (OSI)

The Windows-based image analysis software allows semi-automated measurement of sediment layers, penetration, apparent RPD, and calculation of the OSI. The software interface also allows simultaneous measurement and entry of visually measured parameters such as grain size major mode, mud clasts, and infaunal successional stage. The image analysis results are exported directly into the REMOTS® database, which then generates data files that are directly imported into ArcView® GIS for graphical display. All data are edited and verified by a senior-level SAIC scientist before final data synthesis, statistical analyses, and interpretation.

Dredged Material Distribution

The presence of dredged material in SPI images is determined based on the optical differences in sedimentary characteristics of the dredged material relative to the ambient seafloor. Dredged material can be characterized by three criteria: 1) a combination of surficial gray cohesive mud clasts (sand size or larger), 2) a surface layer of mineral sand, or 3) presence of calcareous shell fragments or shallow water molluscs. The dredged material may also have unique color, textural, or fabric properties relative to the ambient muddy bottom.

Sediment Grain Size

The sediment grain size major mode and range, in phi units, were visually determined from the SPI images by comparison with grain size scales included in the software interface. The grain size comparator is a series of seven Udden-Wentworth size classes (equal to or less than coarse silt up to granule and larger sizes): ≥ 4 phi (silt/clay), 4 to 3 phi (very fine sand), 3 to 2 phi (fine sand), 2 to 1 phi (medium sand), 1 to 0 phi (coarse sand), 0 to -1 phi (very coarse sand), and < -1 phi (gravels). The lower

limit of optical resolution is about 62 µm, allowing recognition of grain sizes equal to or greater than coarse silt. The accuracy of this method has been documented by comparing SPI estimates with grain size statistics determined from laboratory sieve analyses (SAIC, 1986).

Prism Penetration Depth

The prism penetration depth is determined by measuring both the largest and smallest linear distance between the sediment-water interface and the bottom of the SPI image. Observations regarding the nature and condition of the sediment-water interface also are recorded. Comparative penetration depths from stations of similar grain size give an indication of relative sediment water content and shear strength.

Surface Boundary Roughness

Surface boundary roughness was determined by measuring the vertical distance (parallel to the image border) between the highest and lowest points of the sediment-water interface. In addition, the origin of this small-scale topographic relief is sometimes evident and can be recorded. In most cases, this is either biogenic (mounds and depressions formed by bioturbation or foraging activity) or relief formed by physical process (ripples, scour depressions, rip-ups, mud clasts, etc.). Other surface roughness features are noted when evident, such as shell fragments or lag deposits.

Mud Clasts

When fine-grained, cohesive sediments are disturbed, either by physical bottom scour or faunal activity (e.g., decapod foraging), intact clumps of sediment are often scattered about the seafloor. Following dredged material disposal, relict sediment clumps may also be present on the seafloor. These mud or clay clasts can be seen at the sediment-water interface in SPI images. During analysis, the number of clasts is counted, the diameter of a typical clast is measured, and their oxidation state is assessed. The size and shape of mud clasts (angular or rounded) is also considered. Mud clasts may be moved about and broken by bottom currents and/or animals (macro or meiofauna; Germano, 1983). Over time, large angular clasts become small and rounded. Overall, the abundance, distribution, oxidation state, and appearance of mud clasts are used to make inferences about the recent pattern of seafloor disturbance.

Apparent Redox Potential Discontinuity Depth

The upper surface of aerobic fine-grained sediments has a higher light reflectance value than underlying hypoxic or anoxic sediments. This is apparent in SPI images and is due to oxidized surface sediment that contains minerals in an oxidized state (typically an olive color), while the reduced sediments below this oxygenated layer are generally gray or black. The boundary between the colored ferric hydroxide surface sediment and underlying sediment is called the apparent redox potential discontinuity (RPD). The depth of the apparent RPD has proven to be a useful parameter for mapping gradients of enrichment on the seafloor (Rhoads and Germano, 1982; Lyle, 1983).

The actual RPD is the boundary that separates the positive Eh region (presence of free oxygen) of the sediment column from the underlying negative Eh region (absence of free oxygen). The exact location of the Eh boundary (where Eh=0) can only be determined with microelectrodes. Therefore, the reflectance boundary observed in the SPI images is termed the apparent RPD. In general, the depth of the actual RPD will be shallower than the depth of the apparent RPD, because bioturbating organisms mix ferric hydroxide-coated particles downward below the Eh=0 horizon. As a result, the apparent RPD depth provides an estimate of the degree of biogenic sediment mixing. This variable is important in evaluating the effect of colonizing benthos on disposed materials. Bioturbation vertically transports buried reduced compounds to the sediment surface and exposes them to an oxidizing water column (Aller, 1982). Bioturbation also affects sediment transport by changing the physical properties of sediments and their mechanical behavior (Rhoads and Boyer, 1982).

Another important characteristic of the apparent RPD is the contrast in reflectance values at this boundary. This contrast is related to the interactions among the degree of organic-loading in the sediment, bioturbation, and bottom-water dissolved oxygen levels. High inputs of labile organic material increase sediment oxygen demand, stimulate sulfate reduction rate, and result in sulfitic products. This results in more highly reduced (lower-reflectance) sediments at depth and higher RPD contrasts. In a region where generally low RPD contrasts exist, images with high RPD contrasts indicate localized sites of relatively high inputs of organic-rich material, such as dredged material.

Infaunal Successional Stage

The mapping of infaunal successional stages from SPI images is based on the theory that organism-sediment interactions follow a predictable sequence after a major seafloor perturbation. This theory states that primary succession results in a predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance (Rhoads and Germano, 1982). These invertebrates interact with sediments in specific ways. Because functional types are the biological units of interest, the definition does not demand a sequential appearance of particular invertebrate species or genera (Rhoads and Boyer, 1982). This theory is formally developed in Rhoads and Germano (1982) and Rhoads and Boyer (1982) and is based on a large body of observations from water depths of less than 30 meters.

The succession of infaunal stages in deep-water environments is not as well studied as in shallow water environments. Consequently, the use of REMOTS® analysis to characterize biological parameters and make predictions about deep-sea recolonization patterns has not yet been fully demonstrated. However, the principles of the shallow water successional stage paradigm can be applied, with caution, to the analysis of biological processes in deep-sea sediments.

In shallow water environments, infaunal succession following a major seafloor disturbance initially involves pioneering populations (Primary or Stage I succession) of very small organisms that live at, or near, the sediment-water interface (Pearson and Rosenberg, 1978; Rhoads and Germano, 1986). In the absence of further disturbance, these early successional assemblages are eventually replaced by infaunal deposit feeders; the start of this "infaunalization" process is designated as Stage II. Large, deep-burrowing infauna, or Stage III taxa, represent a high-order successional stage typically found in low disturbance regimes. The mapped distribution of deep infaunal assemblages may be useful in identifying undisturbed sites in both shallow and deep-water environments.

Many deep-burrowing infauna feed at depth in a head-down orientation. This localized feeding activity results in distinctive excavations called feeding voids. Diagnostic features of these feeding structures include a generally semicircular shape with a flat bottom and arched roof, and a distinct granulometric change in the sediment particles overlying the floor of the structure. The relatively coarse-grained material represents particles rejected by the head-down deposit-feeder, as these deep-dwelling infauna preferentially ingest the finer sediment particles. Other subsurface structures, including burrows or

methane bubbles, do not exhibit these characteristics. The bioturbation activities of these deposit-feeders are responsible for aerating the sediment and causing the redox horizon to be located several centimeters below the sediment-water interface.

Organism-Sediment Index

The Organism-Sediment Index provides a measure of general benthic habitat quality based on dissolved oxygen conditions, depth of the apparent RPD, infaunal successional stage, and presence or absence of sedimentary methane (Rhoads and Germano, 1986). The OSI is a numerical index ranging from -10 to +11. The lowest value is given to bottom sediments with low or no dissolved oxygen in the overlying bottom water, no apparent macrofaunal life, and methane gas present in the sediment. High OSI values are given to aerobic bottom sediments with a deep apparent RPD, mature macrofaunal community, and no methane gas. Low dissolved oxygen conditions and methane gas have not been observed at the SF-DODS.

Biological processes in deep-water environments are not as well studied as in shallow water environments, so changes or adjustments may be necessary to calculate the OSI in deep-water environments. However, calculation of the OSI at the SF-DODS provides a general parameter for assessing benthic habitat quality. The numerical values and ranges used in calculating the OSI are provided in Table 4-1.

Table 4-1. Calculation of the Organism-Sediment Index.

Choose One Value:

Mean RPD Depth Classes	Index Value
0.00 cm	0
> 0 - 0.75 cm	1
0.76 - 1.50 cm	2
1.51 - 2.25 cm	3
2.26 - 3.00 cm	4
3.01 - 3.75 cm	5
> 3.75 cm	6

Choose One Value:

Successional Stage	Index Value
Azoic	- 4
Stage I	1
Stage I - II	2
Stage II	3
Stage II - III	4
Stage III	5
Stage I on III	5
Stage II on III	5

Choose One or Both if Appropriate:

Chemical Parameters	Index Value
Methane Present	- 2
No/Low Dissolved Oxygen	- 4

SPI Organism-Sediment Index = Range: - 10 + 11

4.2.2 Sediment Chemistry

Sediment samples collected during the SF-DODS monitoring were shipped via overnight courier to Columbia Analytical Services (CAS), of Kelso, Washington. Samples were analyzed for total volatile solids, total organic carbon, grain size distribution, diesel range organics (DRO) and residual range organics (RRO), metals, butyltins, polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides, and polychlorinated biphenyls (PCBs). The analytical methodology and target detection limits are provided in Table 4-2. Analytical methodology, quality control, and detection limit requirements followed the "Green Book" (U.S. EPA/USACE, 1991) and the SF-DODS Site Monitoring and Management Plan Implementation Manual (U.S. EPA, 1998). This included the analysis of blanks, triplicates, matrix spikes and duplicates, and reference material at the required frequency.

Total solids and total volatile solids were measured after the sediment samples were oven dried. Total organic carbon was measured using a carbonaceous analyzer that converts the organic carbon in the sample to carbon dioxide, which is then measured directly by an infrared detector. The grain size analysis was performed using a modified ASTM Method D422. Sediments for metals analysis (except mercury) were prepared using the strong acid digestion technique described in SW-846 (EPA Method 3050A; U.S. EPA, 1986 and updates). Following digestion, the subsequent solutions were analyzed by Graphite Furnace Atomic Absorption Spectrometry (GFAA) for arsenic, cadmium, antimony, selenium, silver, and thallium. Beryllium, chromium, copper, lead, nickel, and zinc were analyzed by Inductively Coupled Plasma Emission Spectroscopy (ICP), while mercury was analyzed using Cold Vapor Atomic Absorption Spectrometry (CVAA).

PAHs were extracted from the sediment samples using a sonication method (EPA method 3550) and analyzed by Gas Chromatograph/Mass Spectrometry (GC/MS). PCBs and chlorinated pesticides were first extracted from the sediment samples using a soxhlet technique (EPA method SW 3540) and analyzed by GC/Electron Capture Detection (GC/ECD).

Table 4-2. Analytical methodology and target detection limits.

Parameters	EPA Methods		Sediment Target Detection Limit
	Prep	Analysis	
Conventionals			
Total Solids (%)	--	SM 160.3M	0.05
Total Volatile Solids (%)	--	SM 160.4M	0.05
Total Organic Carbon (%)	--	ASTM D4129-82M	0.05
Grain Size (%)	--	ASTM D-422M	0.1
Sulfides, dissolved (mg/kg)	--	9030M	2
Metals (mg/kg dw)			
Arsenic	3050A	200.8	0.5
Cadmium	3050A	200.8	0.05
Chromium	3050A	200.8	0.2
Copper	3050A	200.8	0.1
Lead	3050A	200.8	0.02
Mercury	7471	7471	0.2
Nickel	3050A	200.8	0.2
Selenium	3050A	200.8	1
Silver	3050A	200.8	0.02
Zinc	3050A	200.8	0.2
Organics (µg/kg dw)			
PAHs	3550B	8270C SIM	5
Pesticides	3540C	8081A	1.0 – 3.0(a)
PCBs	3540C	8082	15(b)
Butyltins (ug/kg dw)			
Tri-n-butyltin	3550B	Krone	0.025-0.050

(a) Target detection limits for chlordane and toxaphene are 30 and 400 µg/kg, respectively.
(b) Target detection limit for PCB Aroclor 1221 is 130 µg/kg.
SM Standard Methods for the examination of water and wastewater.
dw Dry weight

Note: Samples with high moisture contents or matrix interferences will have detection limits higher than those listed in Table 4-2.

4.2.3 Benthic Infauna

Laboratory Methods

The September 2002 benthic infauna samples were sorted by Oceans Taxonomic Services, Plymouth, MA. Samples were sorted into major taxonomic categories and returned to the ENSR Marine & Coastal Center in Woods Hole, MA for identification and enumeration. All specimens were identified to the lowest possible taxonomic category, usually species. Organisms such as planktic fauna and colonial epifauna were not included in the raw data files. Data were recorded either on specially printed datasheets or electronically. All data were carefully transcribed to an Excel® spreadsheet and then carefully proofread from the original sources.

Taxa were coded with a four-digit code established as part of the original baseline studies conducted in 1990 and 1991 for the U.S. Navy and U.S. EPA and used in the site designation process. The raw data were then carefully inspected and a "good species" file produced that was the final data set for analysis. The "good species" list excludes infaunal taxa such as juveniles and indeterminates that could not be taken to the species level, as well as epifauna, shell-borers, and parasites. However, indeterminate organisms of valid benthic infaunal species were included in calculations of total density, which were made on raw data adjusted for removal of sediment grain size cores. The raw data are presented in Appendix C.

Data Analysis

Initial inspection of the benthic data included production of summaries of species densities by sample, tables of species dominance, and lists of numbers of species and numbers of individuals per sample. Data were inspected for any obvious faunal shifts or species changes between stations. Following these preliminary inspections of the data, a series of community parameters was calculated along with multivariate statistics to assess community patterns and structure.

The multivariate programs are included in COMPAH96, originally written by Dr. Donald Boesch and now available from Dr. Eugene Gallagher (http://www.es.umb.edu/edgwebp.htm). Patterns in benthic communities were analyzed by cluster analysis using new CNESS (chord-normalized expected species shared), which was developed by Gallagher and is related to Grassle and Smith's (1976) NESS (normalized expected species shared). NESS was originally developed for analysis of deep-sea benthic

community structure and was used in the 1990-1991 baseline analyses. CNESS and NESS include several indices that can be made more or less sensitive to rare species in the community and as such are more versatile than other similarity measures such as Bray-Curtis similarity, which is influenced by dominant species. Differences between CNESS and NESS are detailed in Trueblood et al. (1994). Both NESS and CNESS are calculated from the expected species shared (ESS) between two random draws of *m* individuals from two samples. For this project, the optimal value of *m* was calculated to value of 10. Results of these analyses were inspected for patterns among and between the different seasons.

Using MATLAB® as an operating platform and additional programs written by Dr. Gallagher, several diversity indices were calculated, including Shannon's H' (base 2), Brillouin's index H (which approximates Shannon-Wiener H' at base $\log_e$), and Gleason's index. Evenness values J' and V, associated with H' and B, respectively, were also calculated. *N.B. In the Baseline studies of 1990 and 1991, the base $\log_e$ for H' was used, but base 2 is considered to be closer to the intent of the developers of the index and thus is more appropriate (Gallagher, personal communication, June 2001).*

The rarefaction (ESn) method (Sanders, 1968) as modified by Hurlbert (1971) is more sensitive to rare species than is Shannon's index, and is another indication of diversity. Rarefaction curves were generated for each replicate sample, with the number of points set at 25, from 1 to the maximal number of specimens in the sample.

May (1975) demonstrated that Sanders-Hurlbert rarefaction curves are often identical to those produced under the assumption that the distribution of individuals among species follows a log-series distribution. Dr. Gallagher has developed a plotting procedure, termed a non-dimensional diversity plot, to show the relationship between rarefaction curves and the expected log-series curve. Using programs written by Dr. Gallagher, May's log-series alpha was calculated to approximate a perfect log-series curve for each sample; this curve was then compared with the one generated by the Hurlbert rarefaction method, and a non-dimensional diversity (NDD) curve produced for each sample. Gallagher suggests an NDD value of 0.75 or more (in either direction) as a benchmark to indicate severe departure from an undisturbed community (Gallagher, in prep.). For this study, the null hypothesis is that there is no departure of NDD in the vicinity of the disposal site boundaries.

Principal Components Analysis of Hypergeometric probabilities (PCA-H) was also applied to the benthic data for each disposal site. PCA-H is an ordination method for visualizing CNESS distances among samples (see Trueblood et al., 1994 for details). The PCA-H method produces a metric scaling of the

samples in multi-dimensional space, as well as two types of plots based on Gabriel (1971). The Euclidean distance biplot provides a two-dimensional projection of the major sources of CNESS variation. The species that contribute to the CNESS variation can be determined using matrix methods adapted from Greenacre's correspondence analysis (Greenacre, 1984). These species are plotted as vectors in the Euclidean distance biplot. The second plot, the Gabriel covariance biplot, shows the association among species. Species that co-occur plot with species vectors with very acute angles. Species that have discordant distributions plot with angles approaching 180°.

5.0 RESULTS

This section presents the results of the SPI survey and sediment chemistry from the September 2002 SF-DODS environmental monitoring survey. Benthic community analysis results for samples collected during the September 2002 survey also are reported. Benthic community analysis was conducted under this Tier 1 program due to difficulties in delineating the perimeter and distinct layers of dredged material deposits associated with 2002 disposal operations relative to previous years. Specifically, the objective of this analysis is to assess any impacts from an apparent accumulation of dredged material over multiple years that has led to a cumulative deposit greater than five centimeters within and outside of the SF-DODS boundaries.

5.1 Analysis of SPI Photography

SPI photography is used to map the dredged material footprint at the SF-DODS and provide information on the grain size of apparent dredged material, depth of the apparent RPD, infaunal successional stage, and benthic habitat quality (OSI). A total of 153 images were collected at 32 SPI stations during the September 2002 survey of the SF-DODS. Three representative images from each station were analyzed using the REMOTS® system to detect the presence of dredged material and measure the physical and biological parameters listed above. A summary of the 2002 image analysis results is presented in Appendix A.

5.1.1 Dredged Material Distribution

The approximate dredged material footprint and mean dredged material thickness (in centimeters) identified at the SF-DODS during the September 2002 SPI survey are presented in Figure 5-1. Dredged material can be identified by its anomalous sedimentary texture relative to the ambient bottom and can be composed of multiple sediment layers of varying colors and textures. The dredged material can include light to dark gray sands and light gray mud clasts (silt-clays) in contrast to the ambient sediments (homogeneous olive brown silt-clays). Figures 5-2 through 5-4 show examples of dredged material (very fine sand to fine sand) overlying ambient silt-clay sediments at the SF-DODS. Figure 5-5 shows examples of ambient sediments without the presence of dredged material. Four stations (50, 57, 110, and 130) showed a layer of ambient sediments overlying a blue-gray clay (Figure 5-6) that may be historical dredged material, or an older sediment deposit that may be an outcropping along the continental slope (SAIC, 1991).

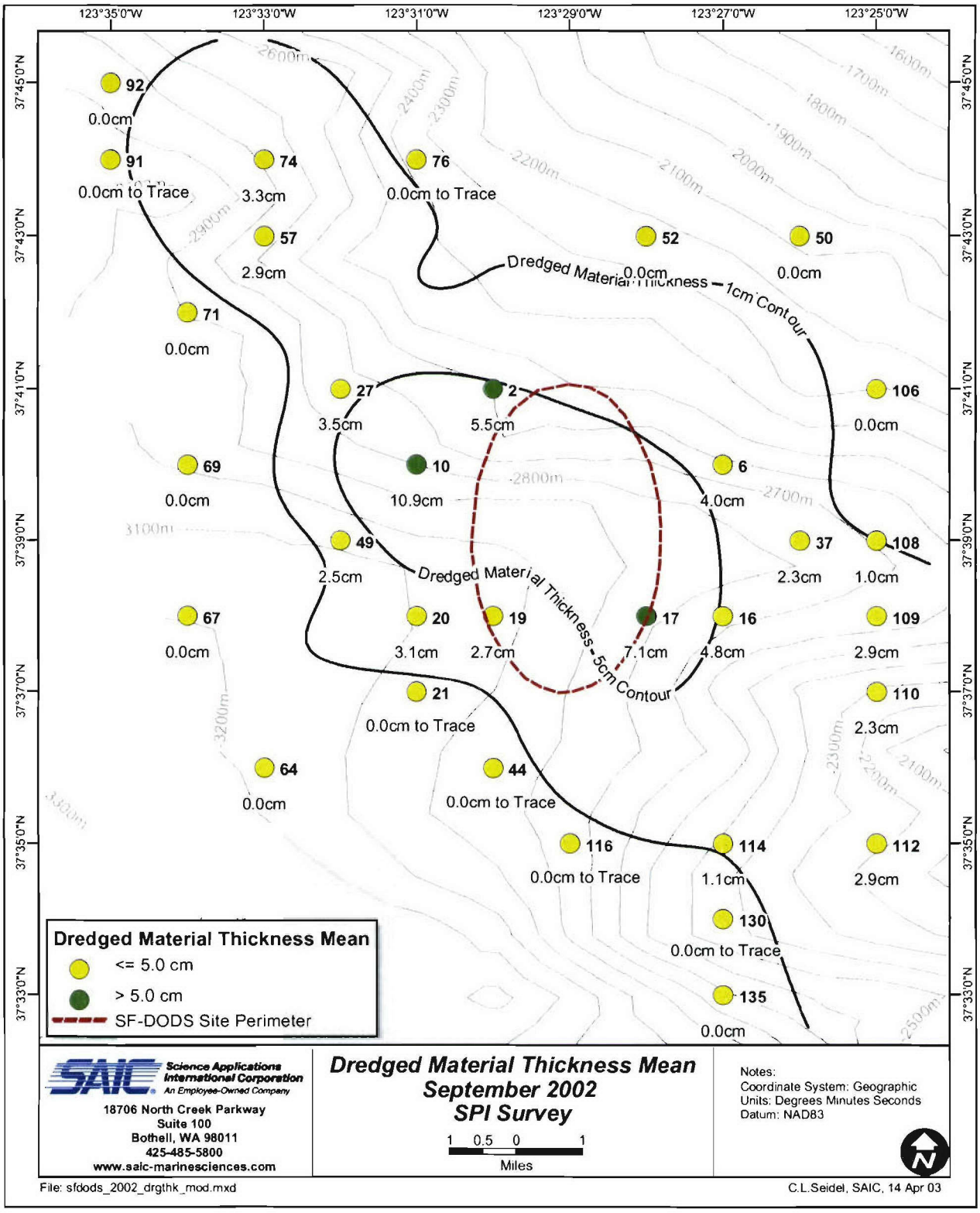


Figure 5-1. Dredged material distribution measured during the September 2002 survey of the SF-DODS.

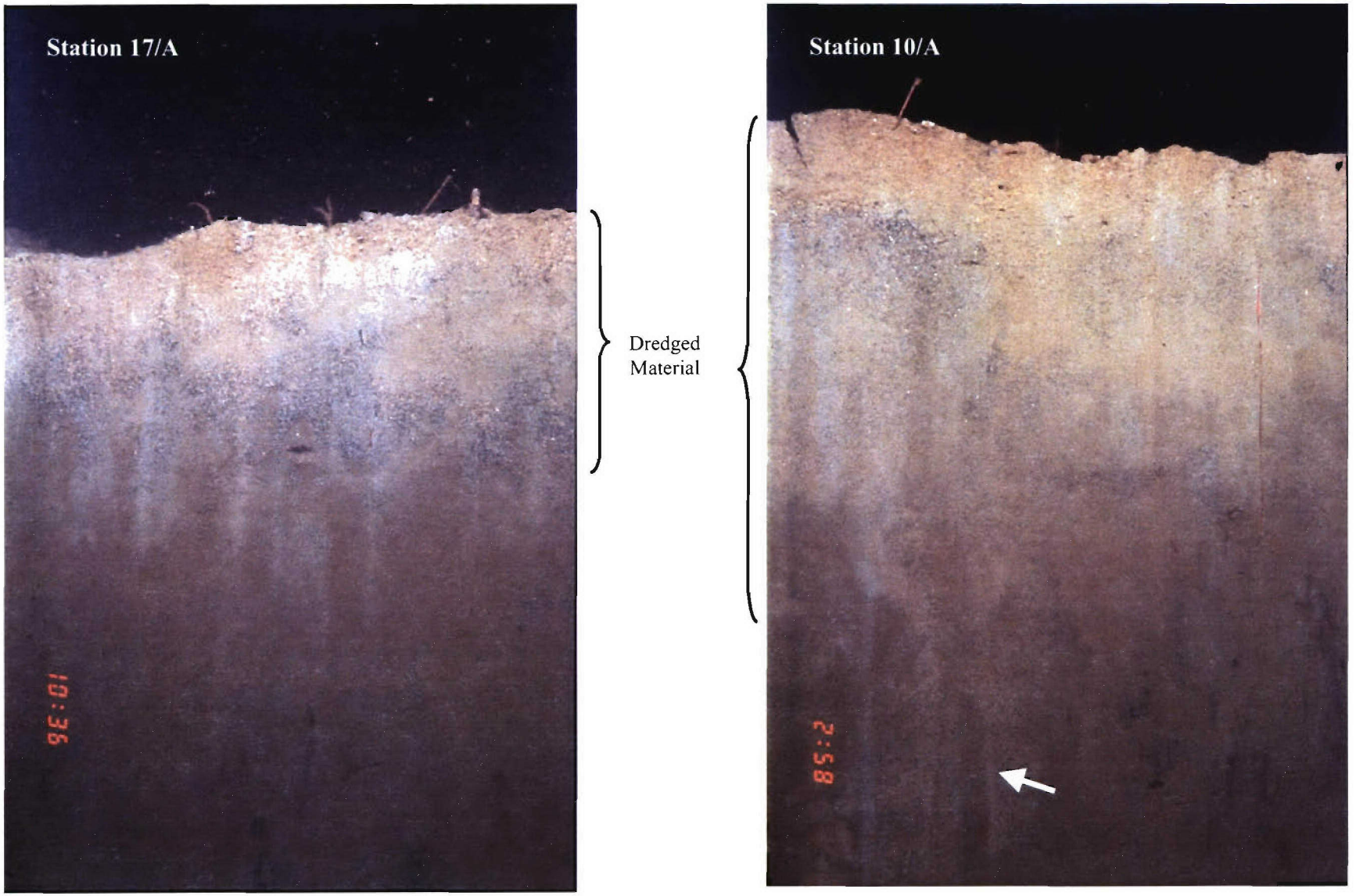


Figure 5-2. SPI images from Station 17 (Replicate A) and Station 10 (Replicate A) showing older dredged material deposits consisting of gray, fine sand. Both images show evidence of downward mixing of dredged material into the tan brown ambient sediments. At Station 10, the white arrow indicates a burrow structure surrounded by fine sand (downward mixed dredged material). Image width is 15 cm.

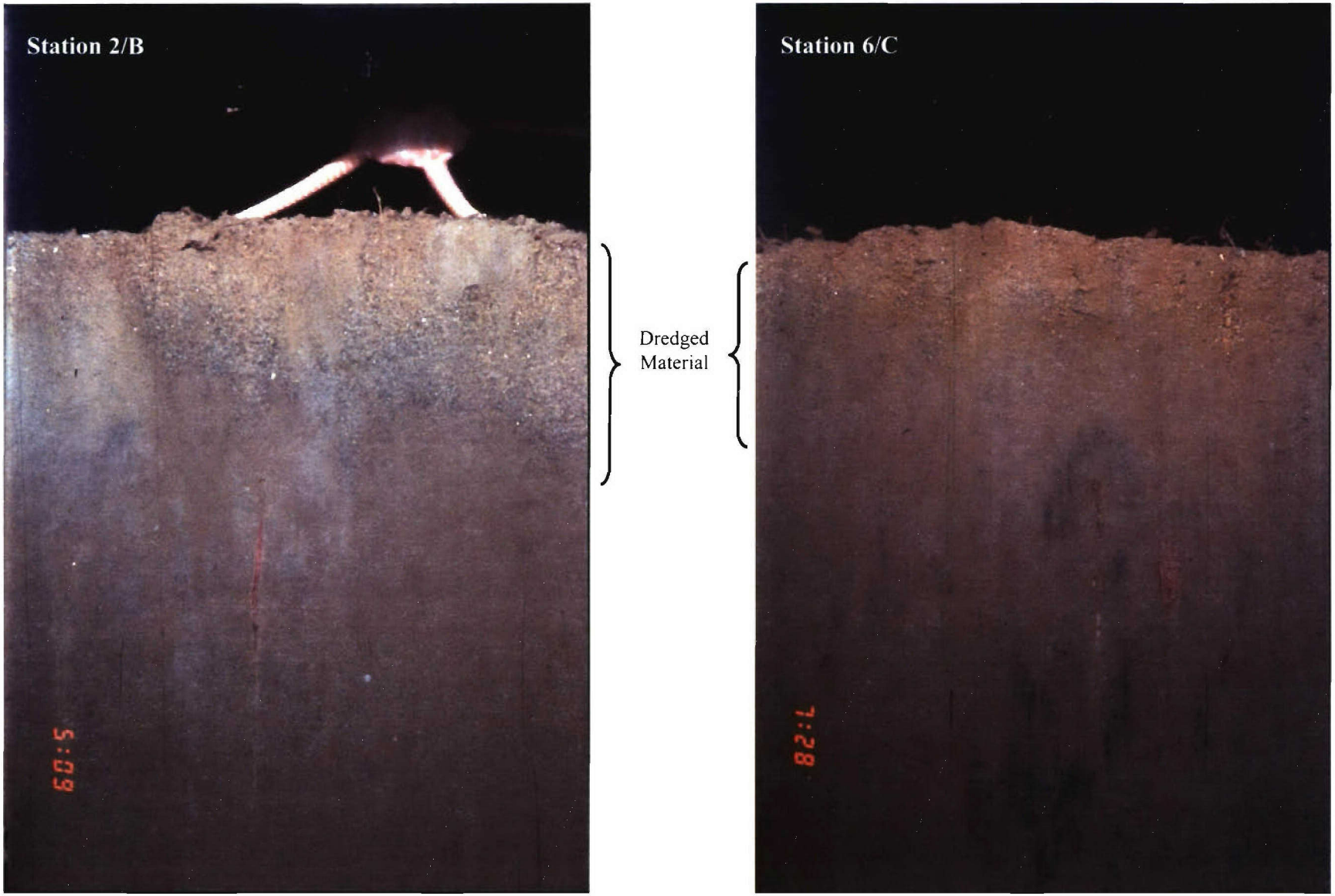


Figure 5-3. SPI images from Station 2 (Replicate B) and Station 6 (Replicate C). Station 2 shows approximately 6.2 cm of dredged material overlying tan brown ambient mud. A brittle star is present on the sediment surface. At Station 6, fine sand is well mixed in the upper 5.1 cm of the sediment column. Image width is 15 cm.

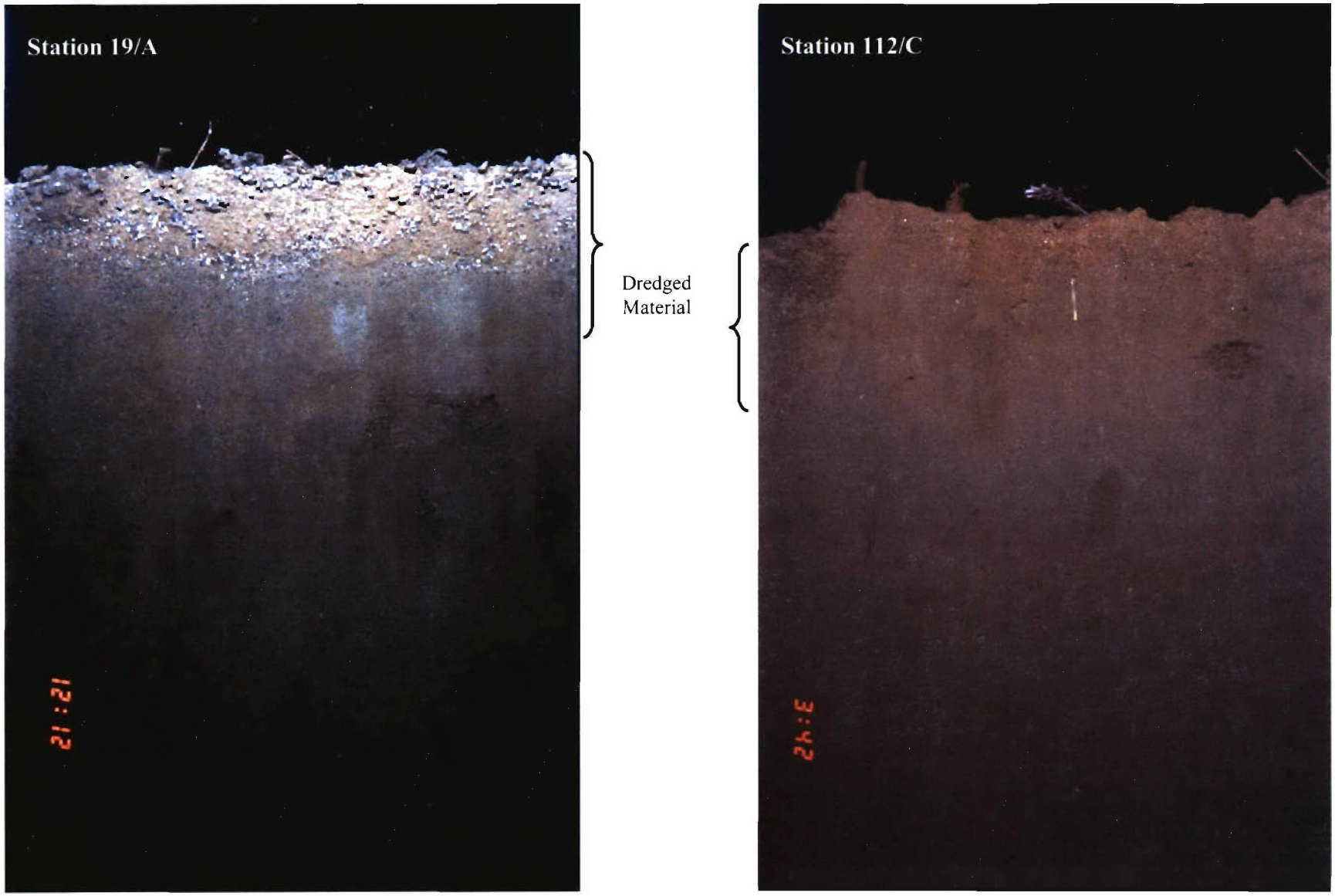


Figure 5-4. SPI images from Station 19 (Replicate A) and Station 112 (Replicate C). Station 19 shows 3.0 cm of light gray mud chips and fine sand that may be recently deposited dredged material. Station 112 shows a trace of fine sand (dredged material) mixed in the top 2.8 cm of the sediment column. A seapen is present on the sediment surface. Image width is 15 cm.

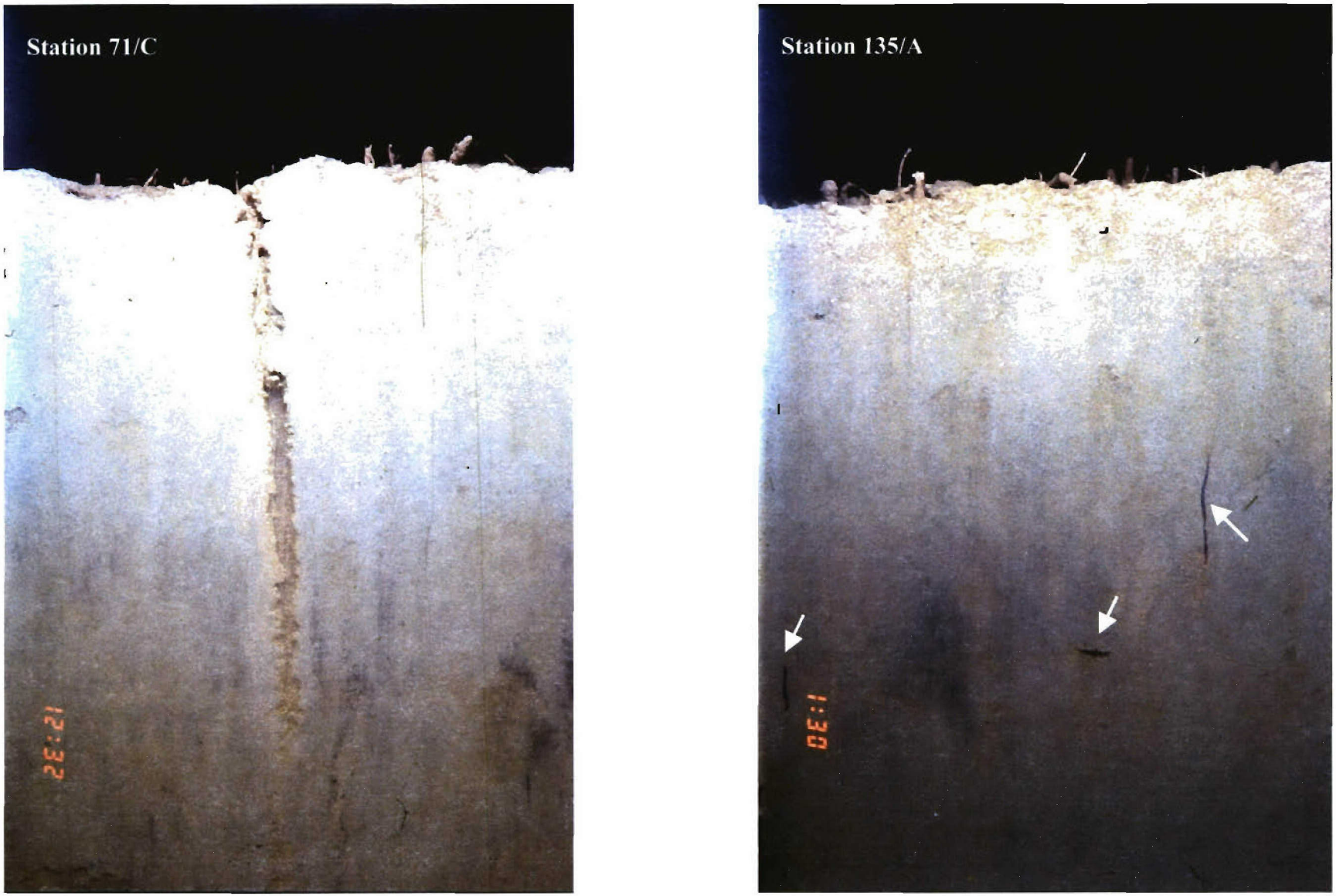


Figure 5-5. SPI images from Station 71 (Replicate C) and Station 135 (Replicate A) showing tan brown ambient sediments. Successional stage is I on III. A large burrow structure is present at Station 71. Polychaetes and a feeding void (arrows) are visible at Station 135. Image width is 15 cm.

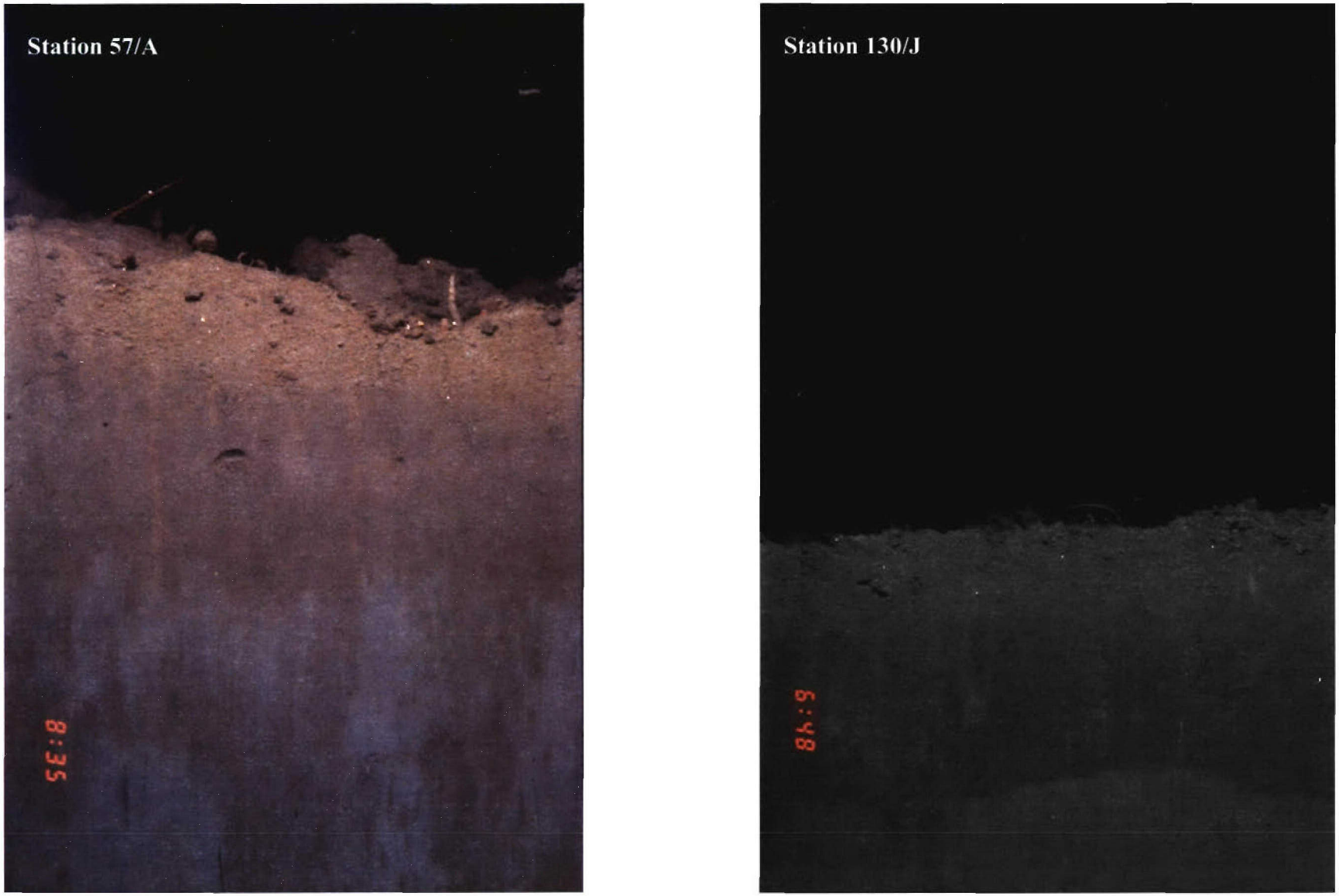


Figure 5-6. SPI images from Station 57 (Replicate A) and Station 130 (Replicate J) showing tan brown ambient mud overlying blue-gray clay. Mud clasts and stranded or bent tubes are present at the sediment-water interface at both locations. Image width is 15 cm.

The 2002 survey focused on collecting data from areas outside of the SF-DODS to define the boundaries of the dredged material footprint. Previous surveys have measured the accumulation of dredged material beyond the site perimeter. Stations 50, 64, 67, 69, 106, 130, and 135 were sampled for the first time in the September 2002 SPI survey and are located on the outer flanks of the dredged material deposit (Figure 5-1). No dredged material was seen at these new stations with the exception of Station 130. A trace amount of dredged material was observed in two of five replicate images at Station 130.

The apparent limit of dredged material based on a contour interval of 1 cm is shown in Figure 5-1. Similar to previous monitoring surveys, the footprint is oriented to the northwest and southeast, generally parallel to the regional slope isobaths. Stations located along the east-southeast perimeter of the dredged material deposit showed the presence of dredged material, so the southeast perimeter of the deposit could not be determined. Stations 10 and 17 are in close proximity to the disposal site perimeter and showed the greatest apparent accumulation of dredged material (10.9 cm and 7.1 cm, respectively). The relatively thick dredged material layer at Station 10 is related to the downward mixing of dredged material into the sediment column by bioturbation (Figure 5-2). Thus, the measured depth of the dredged material is likely an overestimate of the thickness of the dredged material layer at this station and does not distinguish between new and old deposit layers.

The measurement of discrete dredged material layers is no longer straightforward due to the number of disposal events that have taken place at the SF-DODS since 1995, downward mixing of dredged material due to bioturbation, possible burial by submarine slumping (turbidites), and possible erosion or down-slope movement of dredged material (mass wasting). In the case of mass wasting, evidence of dredged material that may have been mapped in early surveys may be lost. However, the overall distribution and thickness of dredged material measured during the September 2002 survey of the SF-DODS are similar to measurements made during the 2001 survey (Tetra Tech, 2002). Most dredged material observed during the September 2002 survey appears to be older (not recently deposited), showing evidence of mixing or downward reworking of material into the sediment column (see Figures 5-2 through 5-4).

The grain size of dredged material seen in the SPI images consisted of very fine (3 phi), and fine (2 phi) sand (Figure 5-7). The majority of dredged material consisting of fine sand was found near the disposal site perimeter, which is consistent with the expected dredged material deposition pattern (i.e., coarse-grained sediments are deposited closer to the site center than finer-grained sediments).

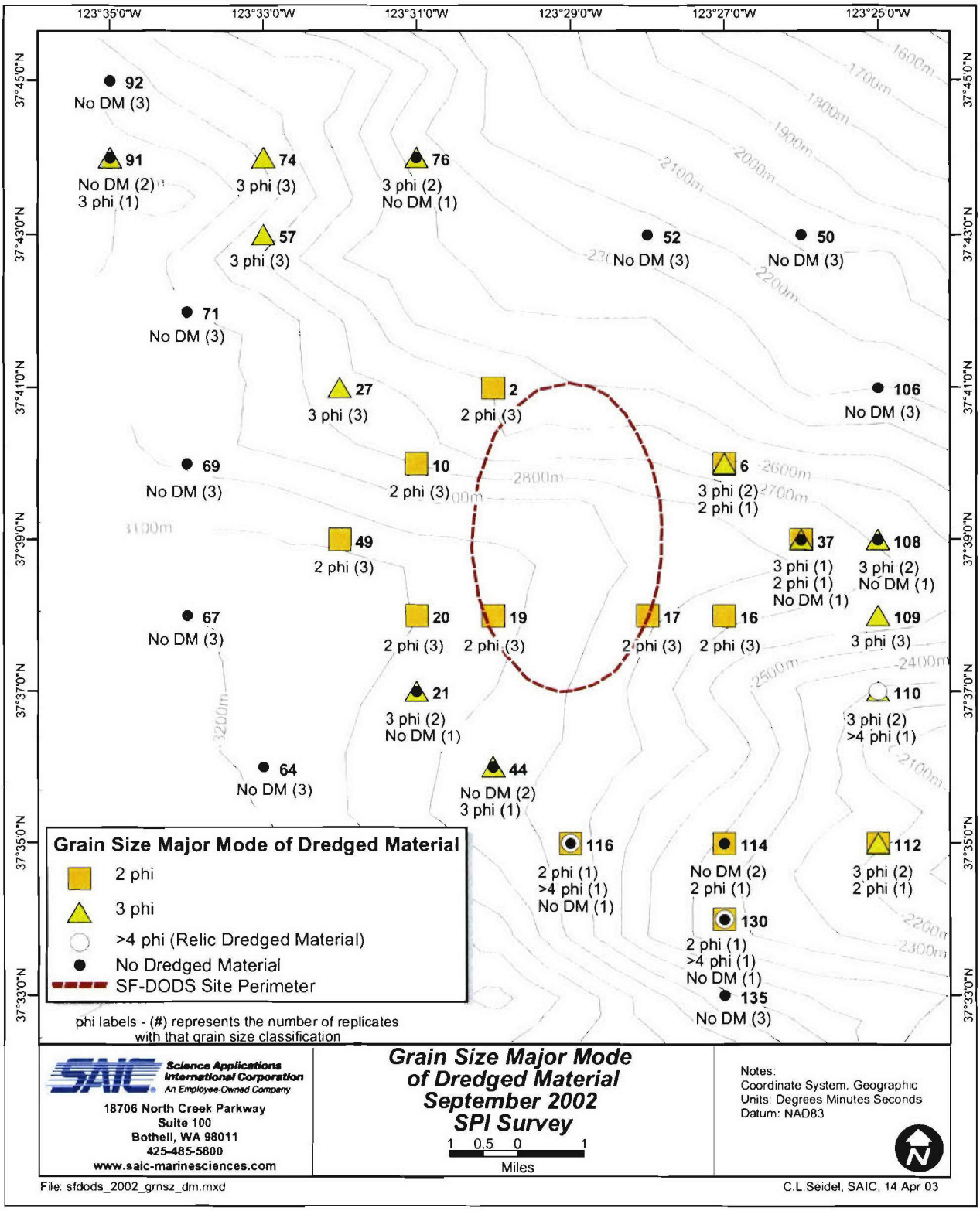


Figure 5-7. Grain size major mode of dredged material at the SF-DODS in September 2002.

5.1.2 Mean Small-Scale Boundary Roughness

Mean small-scale boundary roughness (surface relief) measured at the SF-DODS during the September 2002 survey is presented in Figure 5-8. Surface relief is the difference between the highest and lowest penetration depth measured in an image and can indicate disturbances to the seabed due to physical and biological processes. Boundary roughness ranged from 0.5 to 2.1 cm and had a major mode of 0.5 to 0.99 cm, similar to the pre-disposal baseline survey (SAIC, 1991). The roughness was determined to be physical in origin for 54 of 96 replicates (56 %). The remaining replicates indicated biological roughness with the exception of two replicates from Station 108 that were indeterminate as to the source of boundary roughness. Current scouring of surface sediments, slope failure, or turbidite formation can create physically induced boundary roughness elements such as mud clasts and stranded or broken polychaete tubes (Hecker, 1992; see Figure 5-6). Biogenic activity that leads to boundary roughness includes the formation of fecal mounds, burrow excavation mounds, megafaunal foraging, or feeding pits.

5.1.3 Mean Penetration Depth

The distribution of SPI camera prism penetration (in centimeters) in surface sediments at the SF-DODS is presented in Figure 5-9. Mean penetration depth is the distance that the SPI camera prism penetrates into the sediment. If camera weights and stop settings are maintained during the entire survey, prism penetration provides a relative measure of sediment bearing capacity. Mean penetration depths at the SF-DODS are relatively deep (14 to 20 cm) due to unconsolidated, fine-grained sediments that experience bioturbation and have high water content (Figure 5-3). Six stations (19, 21, 49, 67, 69, and 112) had at least one replicate with mean penetration depths greater than 20 cm. At Station 130, consolidated blue-gray clay present below ambient sediments limited mean prism penetration depth to 8.0 cm (Figure 5-6).

5.1.4 Mean Apparent Redox Potential Discontinuity (RPD) Depths

The apparent redox potential discontinuity depth estimates the depth of oxygenation in the upper sediment column and reflects the degree of biogenic sediment mixing. Mean apparent RPD depths at the SF-DODS during the September 2002 monitoring survey are mapped in Figure 5-10 and had a major mode between 4.0 and 4.5 cm. The depth of sediment oxygenation is deeper in 2002 compared to the pre-disposal baseline SPI survey, which had a major mode of 2.5 to 3.0 cm for RPD depths (SAIC, 1991). The apparent increase in RPD depths may be due to difficulties by the computer image analysis system in identifying the RPD in

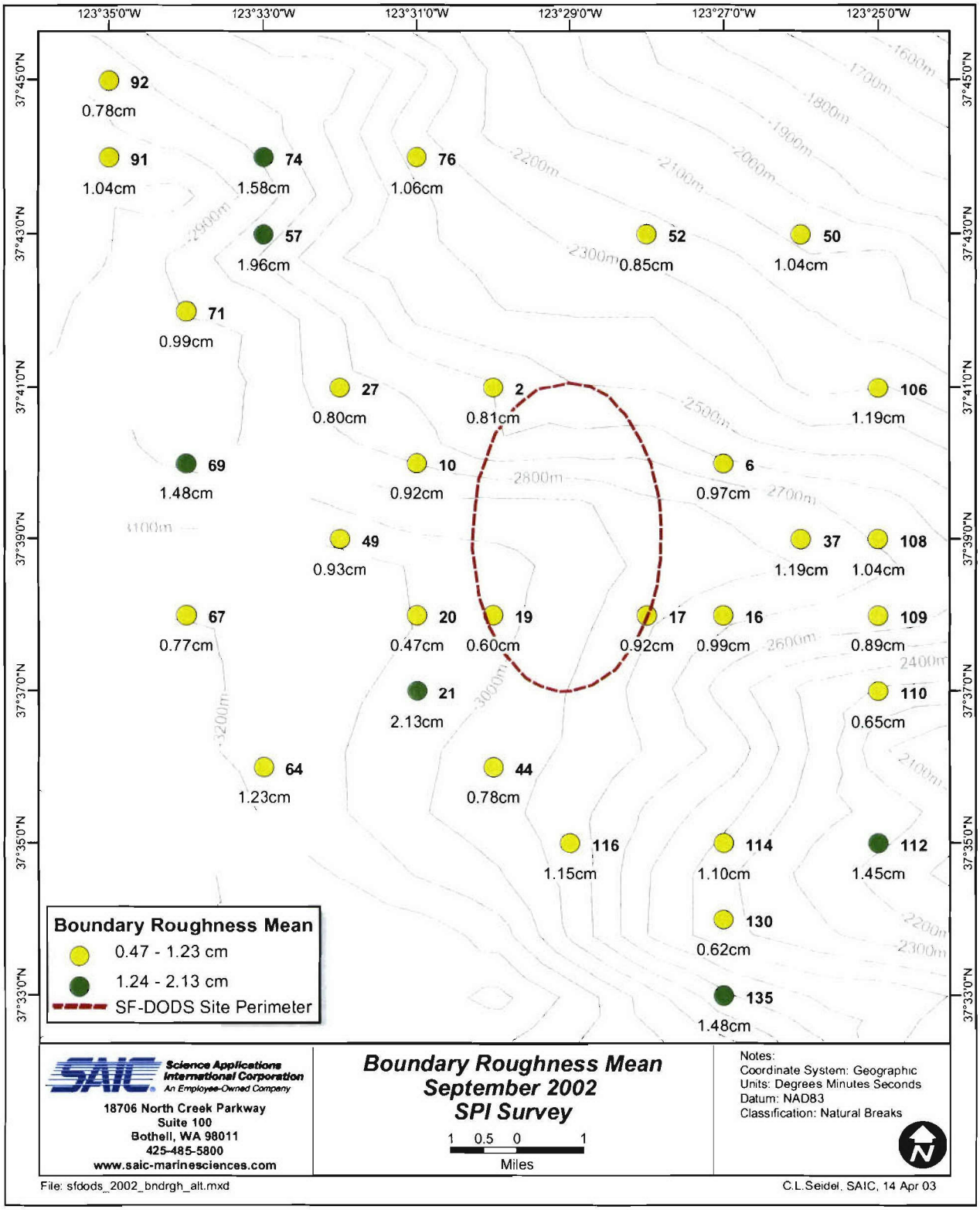


Figure 5-8. Surface relief measured at the SF-DODS in September 2002.

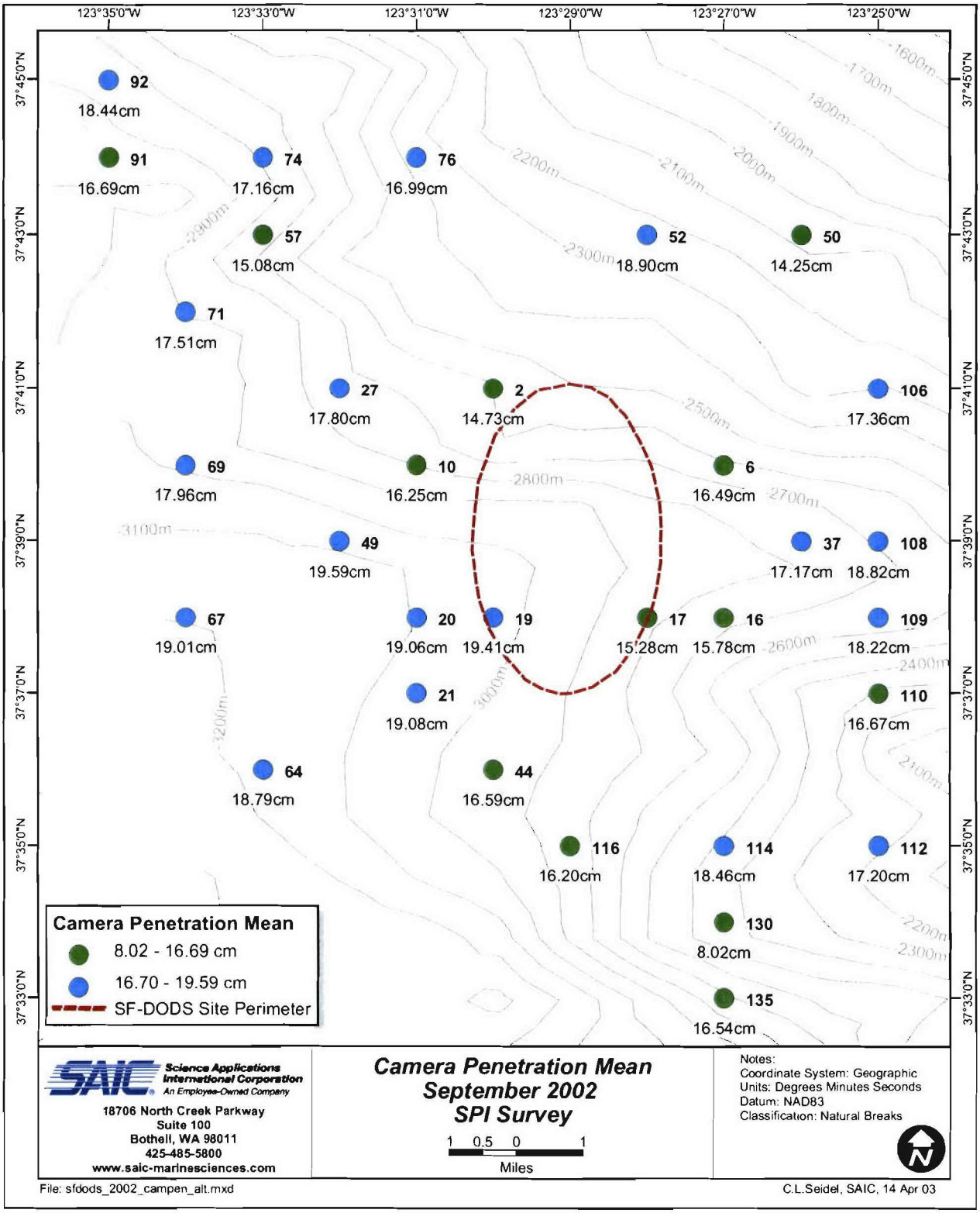


Figure 5-9. Mean SPI camera prism penetration at the SF-DODS in September 2002.

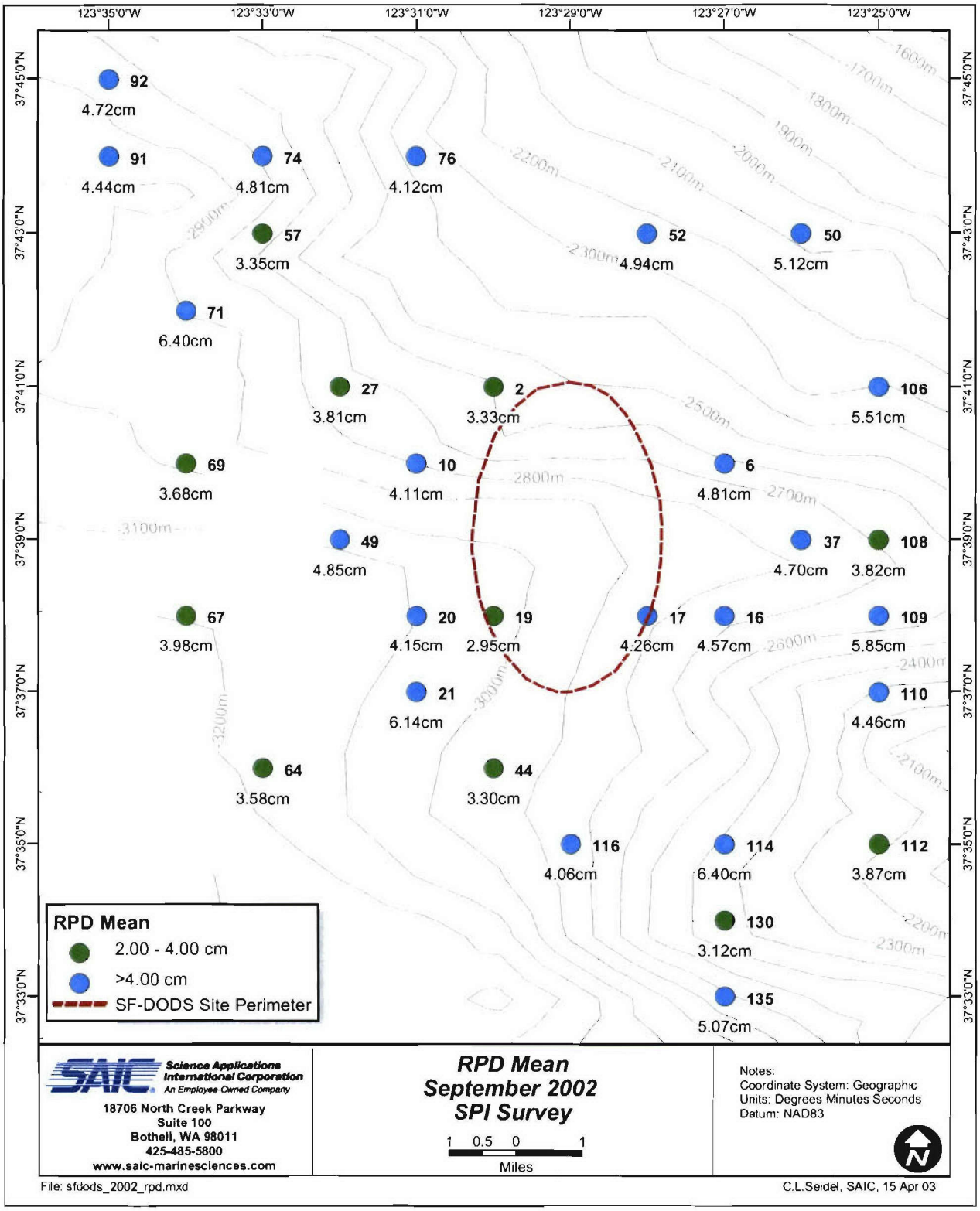


Figure 5-10. Mean apparent RPD depths at the SF-DODS in September 2002.

sediments with little to no color contrast (clay) rather than an increase in the depth of oxygenation at the SF-DODS. Conversely, deeper apparent RPD depths could be due to the recent accumulation of turbidites. Sediments that are deposited through submarine slumping (turbidites) will be mixed and aerated during downslope movement. This can result in an oxidized, high reflectant appearance of sediments and deeper apparent RPD depths. A similar effect was observed in recently deposited sediments within the disposal site boundary during the 1997 survey of the SF-DODS (SAIC, 1999b). Sedimentation of dredged material particles through the water column exposed these organic-mineral aggregates to oxidative processes and resulted in deeper apparent RPD depths in surface sediments (SAIC, 1999b).

5.1.5 Infaunal Successional Stages

The infaunal community at the SF-DODS consists of small surface feeding or filtering Stage I organisms and larger head-down deposit feeders (Stage III). Most of these species are polychaetes (SAIC, 1992a and Blake et al., 1994). Organic detritus from the productive waters overlying the continental slope off the Farallon Islands supports a rich and diverse benthic community in the SF-DODS region (Blake et. al., 1994). During the September 2002 survey, both Stage I and Stage III infauna were represented at all stations, with the exception of stations 2 and 130 (Figure 5-11). Stations 2 and 130 show the presence of Stage I but lack Stage III infauna. At Station 2, polychaetes are visible in sediments below approximately 3.3 cm of dredged material, which suggests that the benthic community is in transition to Stage III (Figure 5-3). The apparent absence of Stage III infauna at Station 130 does not appear related to deposition of dredged material. Consolidated blue-gray clay is present below ambient sediments and surface erosion was evident at Station 130, suggesting that the upper slope area may experience periodic episodes of slope failure, which has the potential to retrograde the benthic infaunal community (Hecker, 1992).

5.1.6 Organism-Sediment Indices

The Organism-Sediment Index provides a measure of general benthic habitat quality, which considers dissolved oxygen concentrations within the upper sediment column, presence or absence of sedimentary methane, the depth of the apparent RPD, and the infaunal successional stage. Sedimentary methane has not been observed in SF-DODS surface sediments. The OSI ranges from -10 to +11 and is useful for showing gradients of sediment disturbance (Rhoads and Germano, 1986).

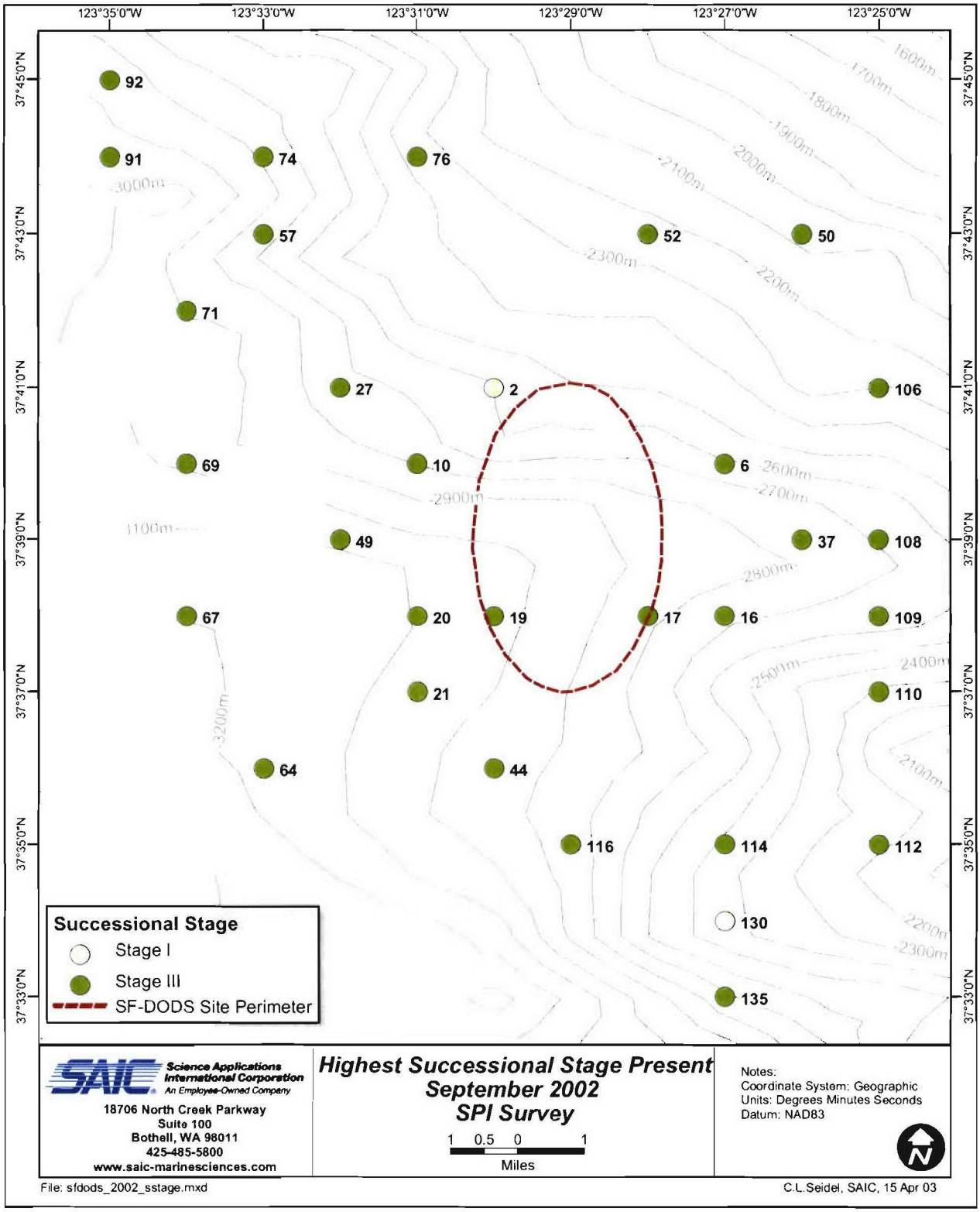


Figure 5-11. Infaunal successional stage at the SF-DODS in September 2002.

OSI values at the SF-DODS ranged from +5 to +11 during the September 2002 survey (Figure 5-12). OSI values of +6 to +11 represent relatively undisturbed ambient conditions or conditions where physical disturbances have occurred (from natural slumping, or from dredged material placement) but Stage III communities are present. Stations 2 and 130 show OSIs of +6 and +5, respectively and indicate slightly disturbed conditions due to the apparent absence of Stage III infauna. Station 2 appears in transition to a Stage III community and the OSI will eventually transition to a higher value reflecting improved benthic habitat quality. Station 130 is located along a slope that may experience physical disturbance due to slumping. A hiatus in physical disturbance could allow establishment of a Stage III community and an increase in the OSI. In summary, OSI values suggest that dredged material disposal has had minimal impact on benthic habitat quality at the SF-DODS, or enough time has passed for the benthic habitat to recover from any impacts due to dredged material disposal.

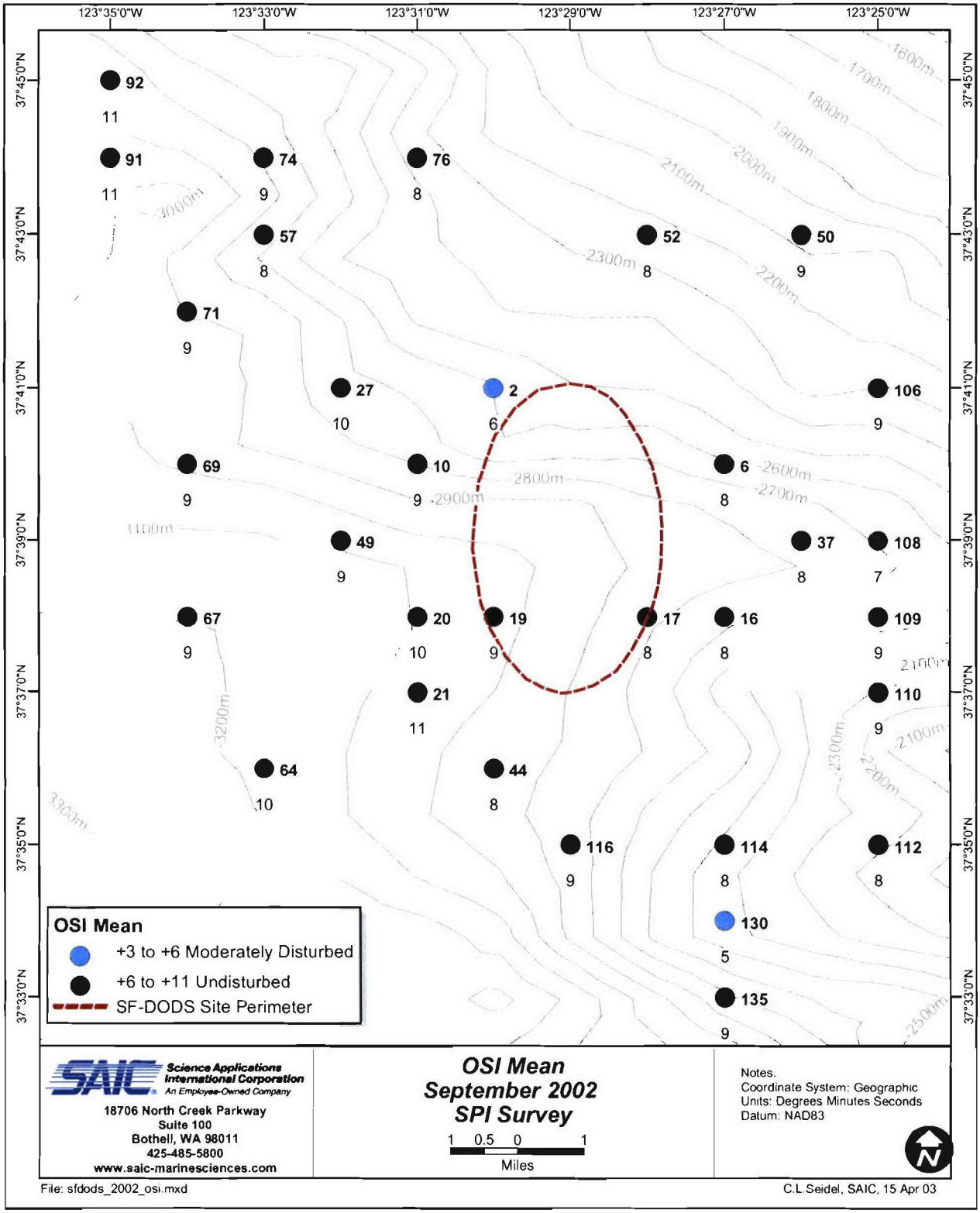


Figure 5-12. OSI distribution at the SF-DODS in September 2002.

5.2 Sediment Chemistry Results

Sediment composite samples were collected using a box corer (Section 4.1.3) from 15 stations and analyzed for the target compounds listed in Table 4-2. The analytical results for surface sediment (0-10 cm) chemistry and selected conventionals from this survey are summarized in Table 5-1. A complete presentation of the September 2002 sediment chemistry data, including all analytical results and Quality Control (QC) data, is presented in Appendix B. A summary of data Quality Assurance (QA) and data validation report (Level QA1 data validation) also can be found in Appendix B.

This section presents the conventional and contaminant chemistry results, focusing on the metals and organic compounds that were present at levels above the target detection limits. The 2002 monitoring survey occupied locations within the disposal perimeter, outside the perimeter where deposition of dredged material has been observed in SPI images from this and previous monitoring surveys, and areas from which no dredged material has been documented. Therefore, the analytical results in this section are framed with respect to whether they were collected from outside or within the apparent dredged material footprint identified from SPI images collected during the 2002 survey (Section 5.1; Figure 5-1). A comparison of 2002 survey results to previous surveys of the site, including baseline studies conducted in August 1990 (SAIC 1991) and July 1991 (SAIC, 1992a), as well as monitoring surveys conducted between 1996 and 2000 (SAIC, 1996, 1999a, and 1999b; Tetra Tech 1999, 2000, and 2001) is provided in Section 6.2.

5.2.1 Sediment Conventionals and Grain Size Distribution Results

Sediment samples collected during the 2002 survey were submitted for the following sediment conventional analyses: total solids; total volatile solids; total organic carbon; total sulfides; and grain size distribution. The results for the conventional analyses are summarized in Table 5-1; laboratory reports and data validation results are provided in Appendix B.

Table 5-1. Summary of analytical results for surface sediment conventionals and chemistry: SF-DODS 2002 Monitoring Survey.

Station Number	SF-DODS-006		SF-DODS-010		SF-DODS-013		SF-DODS-016		SF-DODS-017		SF-DODS-019		SF-DODS-020		SF-DODS-023		SF-DODS-027	
Collection Date	09/22/02		09/22/02		09/27/02		09/21/02		09/21/02		09/22/02		09/22/02		09/26/02		09/23/02	
Conventionals (Dry weight)																		
Total Solids (%)	35.1		41.8		52.6		46.4		55.4		37.6		33.1		37.2		38.4	
Total Volatile Solids (%)	8.79		6.90		4.79		6.00		3.89		7.82		9.40		8.89		8.34	
Total Organic Carbon (%)	2.44		1.67		0.90		1.70		1.09		2.60		2.83		2.57		2.24	
Total Sulfides (mg/kg)	12.00		0.90	U	13.00		0.90	U	0.90	U	4.00		0.90	U	16.00		0.90	U
Grain Size (%)																		
Gravel	0.0		0.1		1.5		0.1		0.0		0.0		0.0		0.0		0.0	
Sand	22.3		32.8		37.5		37.0		61.2		25.1		13.3		15.3		23.6	
Silt	35.4		30.7		31.2		24.2		18.9		25.5		29.7		36.8		28.0	
Clay	43.8		36.9		32.0		38.9		20.6		51.5		56.8		49.4		49.3	
Fines (silt + clay)	79.2		67.6		63.2		63.1		39.5		77.0		86.5		86.2		77.3	
Metals (mg/kg dw)																		
Arsenic	3.2		2.9		5.7		2.8		2.4		3.2		3.4		3.1		3	
Cadmium	0.27		0.2		0.19		0.27		0.12		0.23		0.27		0.25		0.24	
Chromium	47.2		40		45.5		40.8		31.6		42.4		45.5		49.8		42	
Copper	34.5		30.5		26		25.6		17.8		37		44.3		37.9		34.5	
Lead	7.45		6.45		17		5.43		6.33		6.46		6.88		6.84		7.4	
Mercury	0.11		0.09		0.16		0.08		0.07		0.11		0.12		0.11		0.1	
Nickel	59		51.6		52.5		48.6		37.8		55.6		61		61		56.1	
Selenium	3.3		2.3		0.3	B	2.3		1.2		3.1		4		2.7		3	
Silver	0.488		0.407		0.234		0.425		0.222		0.51		0.594		0.497		0.452	
Zinc	78.1		68.7		68.4		63.2		42.1		75.2		85.3		84		78.1	
Organotins (ug/kg)																		
Tri-n-butyltin	2.9	U	2.4	U	4.2		2.2	U	1.0	J	2.7	U	3.1	U	2.7	U	2.6	U
Miscellaneous Organic Compounds (mg/kg)																		
Diesel Range Organics	22	U	19	U	15	U	24	J	15	U	21	J	24	U	20	U	21	J
Residual Range Organics	22	U	19	U	16	J	17	U	15	U	21	U	24	U	21	U	21	U
Pesticides (ug/kg)																		
Alpha-BHC	10		2.4	UI	1.1	JP	5.6		2.3		11		3.1	UI	2.7	UI	7	
Beta-BHC	2.9	UI	2.4	UI	0.44	UI	0.66	UI	1.8	UI	1.8	UI	0.96	UI	1.1	UI	3.3	P
Gamma-BHC (Lindane)	2.9	UI	2.4	UI	2.5	UI	6	P	0.44	U	4.8	UI	6.8	UI	2.7	UI	5.5	
Delta-BHC	1.1	U	0.89	U	0.71	U	0.8	U	0.67	U	1.4	UI	1.2	U	2	UI	2.8	UI
Heptachlor	0.61	UI	0.33	U	0.26	U	0.3	U	0.25	U	0.36	U	0.74	UI	0.37	U	0.65	UI
Aldrin	3.6		1.8	J	0.72	J	1.1	J	0.79	J	3.9	UI	3.6	P	2.2	J	2.1	J
Heptachlor Epoxide	2.2	UI	0.33	U	0.26	U	0.3	U	0.25	U	0.37	U	0.42	U	0.37	U	0.36	U
Gamma-Chlordane	1.3	JP	1.4	J	0.28	U	0.42	UI	0.35	UI	0.4	U	1.1	JP	2.3	JP	1.3	J
Endosulfan I	0.45	J	0.68	JP	0.76	JP	0.68	JP	0.27	UI	1.5	J	0.55	UI	2.5	JP	2.6	UI

Table 5-1. Summary of analytical results for surface sediment conventionals and chemistry: SF-DODS 2002 Monitoring Survey (continued).

Station Number Collection Date	SF-DODS-050 09/24/02		SF-DODS-057 09/23/02		SF-DODS-064 09/25/02		SF-DODS-092 09/24/02		SF-DODS-114 09/27/02		SF-DODS-116 09/25/02		Min	Max	Mean
Conventionals (Dry weight)															
Total Solids (%)	32.9		42.9		30.5		28.0		35.5		32.7		28.0	55.4	38.7
Total Volatile Solids (%)	9.73		7.12		11.00		11.10		8.87		9.68		3.9	11.1	8.2
Total Organic Carbon (%)	2.91		1.82		3.09		3.08		2.63		3.04		0.9	3.1	2.3
Total Sulfides (mg/kg)	41.00		0.90	U	5.00		5.00		0.90	U	0.90	U	0.9	41.0	6.9
Grain Size (%)															
Gravel	0.0		0.1		0.1		0.0		0.3		0.0		0.0	1.5	0.1
Sand	4.8		26.0		4.1		4.8		8.8		6.4		4.1	61.2	21.5
Silt	31.5		33.7		38.5		38.0		31.7		36.3		18.9	38.5	31.1
Clay	63.2		40.3		58.0		58.4		59.5		60.3		20.6	63.2	47.9
Fines (silt + clay)	94.7		74.0		96.5		96.4		91.2		96.6		39.5	96.6	79.3
Metals (mg/kg dw)															
Arsenic	3.2		2.8		3.4		3.9		3		3.7		2.4	5.7	3.3
Cadmium	0.43		0.32		0.29		0.29		0.53		0.32		0.1	0.5	0.3
Chromium	55.3		44.5		58.1		55.5		53.2		55.6		31.6	58.1	47.1
Copper	30.2		29.4		52.1		44.4		36.6		43		17.8	52.1	34.9
Lead	7.69		6.92		8.35		8.01		21.3		11.3		5.4	21.3	8.9
Mercury	0.1		0.08		0.12		0.12		0.09		0.12		0.1	0.2	0.1
Nickel	64.1		57.7		70.4		68.3		65.4		67.3		37.8	70.4	58.4
Selenium	3		2.4		3.8		3.7		3.8		3.3		0.3	4.0	2.8
Silver	0.609		0.452		0.504		0.574		0.783		0.551		0.2	0.8	0.5
Zinc	85.3		80		104		98.7		135		98.9		42.1	135.0	83.0
Organotins (ug/kg)															
Tri-n-butyltin	3.1	U	2.4	U	3.3	U	3.6	U	2.9	U	3.1	U			
Miscellaneous Organic Compounds (mg/kg)															
Diesel Range Organics	24	U	19	J	26	U	28	U	24	U	26	U	15.0	28.0	21.9
Residual Range Organics	24	U	19	U	26	U	28	U	24	U	26	U	15.0	28.0	21.5
Pesticides (ug/kg)															
Alpha-BHC	3.1	UI	2	JP	3.3	UI	7.7		2.9	UI	12		1.1	12.0	5.1
Beta-BHC	3.1	UI	1.7	JP	0.97	UI	0.93	UI	2.9	UI	0.83	UI	0.4	3.3	1.7
Gamma-BHC (Lindane)	20	P	2.3	JP	8.2	UI	3.6	UI	2.9	UI	0.75	U	0.4	20.0	4.8
Delta-BHC	1.4	UI	1	J	1.3	U	1.4	U	1.9	JP	1.2	U	0.7	2.8	1.3
Heptachlor	0.73	UI	0.63	J	0.45	U	0.49	U	0.55	UI	0.42	U	0.3	0.7	0.5
Aldrin	2.8	J	2	J	1.9	J	2.8	J	2.9	UI	2.6	JP	0.7	3.9	2.3
Heptachlor Epoxide	0.42	U	2.3	UI	0.45	U	0.49	U	0.51	UI	0.42	U	0.3	2.3	0.6
Gamma-Chlordane	1	JP	2.3	UI	0.49	U	1.4	J	2.9	UI	0.64	J	0.3	2.9	1.2
Endosulfan I	1.9	JP	2.3	UI	0.5	UI	0.85	UI	0.67	UI	1.9	JP	0.3	2.6	1.2

Table 5-1. Summary of analytical results for surface sediment conventionals and chemistry: SF-DODS 2002 Monitoring Survey (continued).

Station Number	SF-DODS-006		SF-DODS-010		SF-DODS-013		SF-DODS-016		SF-DODS-017		SF-DODS-019		SF-DODS-020		SF-DODS-023		SF-DODS-027	
Collection Date	09/22/02		09/22/02		09/27/02		09/21/02		09/21/02		09/22/02		09/22/02		09/26/02		09/23/02	
Pesticides (ug/kg)																		
Alpha-Chlordane	2.9	UI	2.3	UI	0.43	UI	0.46	UI	1.2	UI	2.7	UI	3.1	UI	0.67	UI	0.56	UI
Dieldrin	0.88	U	3.4	UI	0.59	U	0.66	U	0.56	U	0.82	U	0.93	U	0.83	U	0.8	U
4,4'-DDE	5.5		2.8		1.8	J	1.9	J	1.9		3.4		2.7	J	3.1		3.7	
Endrin	0.38	U	0.32	U	0.26	U	0.29	U	0.24	U	0.68	UI	0.4	U	0.36	U	0.35	U
Endosulfan II	0.63	U	0.73	UI	0.42	U	0.47	U	0.4	U	2.7	UI	0.66	U	0.59	U	0.94	UI
4,4'-DDD	1.3	JP	0.7	J	0.36	JP	0.66	JP	1.2	J	1.9	J	0.76	JP	0.66	JP	1.1	JP
Endrin Aldehyde	1.1	U	0.85	U	0.68	U	0.77	U	0.64	U	0.94	U	1.1	U	0.95	U	0.92	U
Endosulfan Sulfate	0.46	U	0.39	U	0.31	U	0.35	U	0.29	U	0.43	U	0.49	U	0.44	U	0.42	U
4,4'-DDT	0.49	U	0.41	U	0.33	U	0.37	U	0.87	JP	1.1	UI	0.52	U	0.49	J	0.45	U
Endrin Ketone	2.9	UI	0.39	U	0.31	U	0.35	U	0.29	U	0.43	U	0.49	U	0.43	U	0.42	U
Methoxychlor	1.6	UI	0.91	UI	0.84	UI	0.72	UI	0.39	UI	1.2	UI	1.5	UI	1.2	UI	1.3	UI
Toxaphene	78	UI	52	UI	18	U	34	UI	31	UI	46	UI	44	UI	47	UI	39	UI
PCBs (ug/kg)																		
Aroclor 1016	2.4	U	2	U	1.6	U	1.8	U	1.5	U	2.2	U	2.5	U	2.3	U	2.2	U
Aroclor 1221	2.4	U	2	U	1.6	U	1.8	U	1.5	U	2.2	U	2.5	U	2.3	U	2.2	U
Aroclor 1232	2.4	U	2	U	1.6	U	1.8	U	1.5	U	2.2	U	2.5	U	2.3	U	2.2	U
Aroclor 1242	2.4	U	2	U	1.6	U	1.8	U	1.5	U	2.2	U	2.5	U	2.3	U	2.2	U
Aroclor 1248	2.4	U	2	U	1.6	U	1.8	U	1.5	U	2.2	U	2.5	U	2.3	U	2.2	U
Aroclor 1254	4.9	J	3.5	J	1.6	U	1.8	U	5.5	J	2.2	U	2.5	U	4.4	J	4	J
Aroclor 1260	2.4	U	2	U	1.6	U	1.8	U	1.5	U	2.2	U	2.5	U	2.3	U	2.2	U
SVOCs (ug/kg)																		
Naphthalene	4.3	J	3.4	J	4.7	J	2.5	J	3	J	3.1	J	3.8	J	3.7	J	3.8	J
2-Methylnaphthalene	3.7	J	3.2	J	1.5	J	2.6	J	2.1	J	2.9	J	4.3	J	4	J	3.1	J
Acenaphthylene	0.81	J	0.74	J	1.6	J	0.35	U	0.6	J	0.63	J	0.75	J	0.53	J	0.82	J
Acenaphthene	0.75	J	0.56	J	2.2	J	0.73	J	0.73	J	1.9	J	0.66	J	0.57	U	0.73	J
Dibenzofuran	0.97	J	0.87	J	0.72	J	0.82	J	0.73	J	1.2	J	1.2	J	1.1	J	0.96	J
Fluorene	2.1	J	1.8	J	1.8	J	1.3	J	1.5	J	1.9	J	2.1	J	1.9	J	2.2	J
Phenanthrene	13	J	11	J	23		9	J	9.6		15		11	J	11	J	13	J
Anthracene	3.2	J	3.4	J	5.7	J	2	J	3.9	J	3.3	J	3.2	J	1.8	J	4.3	J
Fluoranthene	19		15		58		10	J	18		20		13	J	11	J	16	
Pyrene	27		23		78		17		31		21		19		13	J	25	
Benz(a)anthracene	9.5	J	7.1	J	23		4.1	J	8	J	5.5	J	5.9	J	4	J	6.8	J
Chrysene	16		8.9	J	31		6	J	12		6.9	J	7.1	J	6.5	J	10	J
Benzo(b)fluoranthene	18		9.8	J	31		6.4	J	13		8.3	J	8.5	J	7.1	J	13	J
Benzo(k)fluoranthene	16		7.8	J	26		5.5	J	11		5.2	J	5.2	J	4.3	J	7.2	J
Benzo(a)pyrene	19		13		43		8.2	J	16		11	J	11	J	7.8	J	13	J
Indeno(1,2,3-cd)pyrene	16		11	J	37		8.4	J	16		10	J	9.3	J	8.5	J	12	J
Dibenz(a,h)anthracene	1.8	J	1.1	J	3.6	J	0.71	J	1.4	J	1	J	1	J	1	J	1.2	J
Benzo(g,h,i)perylene	19		11	J	43		9.4	J	18		12	J	9.3	J	11	J	14	J

Table 5-1. Summary of analytical results for surface sediment conventionals and chemistry: SF-DODS 2002 Monitoring Survey (continued).

Station Number	SF-DODS-050		SF-DODS-057		SF-DODS-064		SF-DODS-092		SF-DODS-114		SF-DODS-116		Min	Max	Mean
Collection Date	09/24/02		09/23/02		09/25/02		09/24/02		09/27/02		09/25/02				
Pesticides (ug/kg)															
Alpha-Chlordane	0.9	UI	1.1	UI	0.73	UI	1.4	UI	0.58	UI	3.1	UI	0.4	3.1	1.5
Dieldrin	0.94	U	0.72	U	1.1	U	1.1	U	2	JP	0.94	U	0.6	3.4	1.1
4,4'-DDE	4.6		3.1		3.2	J	5.3		3.6		4		1.8	5.5	3.4
Endrin	0.41	U	0.31	U	0.44	U	0.48	U	0.38	U	0.41	U	0.2	0.7	0.4
Endosulfan II	0.67	U	0.51	U	0.72	U	0.78	U	0.62	U	0.67	U	0.4	2.7	0.8
4,4'-DDD	1.5	J	2.3	UI	0.85	JP	1.4	JP	4.6		1.4	JP	0.4	4.6	1.4
Endrin Aldehyde	1.1	U	0.83	U	1.2	U	1.3	U	1	U	1.1	U	0.6	1.3	1.0
Endosulfan Sulfate	0.49	U	1	JP	0.53	U	0.58	U	0.46	U	0.49	U	0.3	1.0	0.5
4,4'-DDT	0.53	J	1.2	UI	0.56	U	0.61	U	3.3		0.52	U	0.3	3.3	0.8
Endrin Ketone	0.49	U	0.38	U	0.53	U	0.57	U	0.45	U	0.49	U	0.3	2.9	0.6
Methoxychlor	0.49	U	1.1	UI	1.3	UI	1.6	UI	0.66	UI	1.3	UI	0.4	1.6	1.1
Toxaphene	28	U	100	UI	51	UI	59	UI	110	UI	52	UI	18.0	110.0	52.6
PCBs (ug/kg)															
Aroclor 1016	2.5	U	2	U	2.7	U	3	U	2.4	U	2.6	U	1.5	3.0	2.2
Aroclor 1221	2.5	U	2	U	2.7	U	3	U	2.4	U	2.6	U	1.5	3.0	2.2
Aroclor 1232	2.5	U	2	U	2.7	U	3	U	2.4	U	2.6	U	1.5	3.0	2.2
Aroclor 1242	2.5	U	2	U	2.7	U	3	U	2.4	U	2.6	U	1.5	3.0	2.2
Aroclor 1248	2.5	U	2	U	2.7	U	3	U	2.4	U	2.6	U	1.5	3.0	2.2
Aroclor 1254	3	J	3.8	J	2.7	U	6.5	J	25	J	2.6	U	1.6	25.0	4.9
Aroclor 1260	2.5	U	2	U	2.7	U	3	U	2.4	U	2.6	U	1.5	3.0	2.2
SVOCs (ug/kg)															
Naphthalene	5.2	J	2.8	J	4.3	J	5.2	J	3.5	J	3.5	J	2.5	5.2	3.8
2-Methylnaphthalene	6	J	3.4	J	4.7	J	5.5	J	4.1	J	3.7	J	1.5	6.0	3.7
Acenaphthylene	3	J	0.38	U	0.58	J	0.83	J	0.46	U	0.65	J	0.4	3.0	0.8
Acenaphthene	3.3	J	0.49	U	0.69	U	0.8	J	0.6	U	0.66	J	0.5	3.3	1.0
Dibenzofuran	7.6	J	0.71	J	1.2	J	1.6	J	1.1	J	1.4	J	0.7	7.6	1.5
Fluorene	8.5	J	1.7	J	2.2	J	2.8	J	2	J	2.5	J	1.3	8.5	2.4
Phenanthrene	22		8.7	J	13	J	16	J	8.5	J	14	J	8.5	23.0	13.2
Anthracene	9.5	J	0.94	J	1.4	J	3.1	J	5.2	J	2.4	J	0.9	9.5	3.6
Fluoranthene	24		8	J	12	J	18		7.1	J	15	J	7.1	58.0	17.6
Pyrene	26		11	J	15	J	30		8.2	J	16		8.2	78.0	24.0
Benz(a)anthracene	7.2	J	3.5	J	4.4	J	7.5	J	2.7	J	5.7	J	2.7	23.0	7.0
Chrysene	11	J	5.1	J	7.1	J	12	J	4.5	J	7.8	J	4.5	31.0	10.1
Benzo(b)fluoranthene	13	J	6.1	J	7.5	J	14	J	5.3	J	8.7	J	5.3	31.0	11.3
Benzo(k)fluoranthene	7.8	J	3.4	J	4.4	J	9.1	J	2.1	J	5.3	J	2.1	26.0	8.0
Benzo(a)pyrene	17		6.1	J	8.1	J	15	J	4	J	11	J	4.0	43.0	13.5
Indeno(1,2,3-cd)pyrene	14	J	5.5	J	8.8	J	14	J	4.8	J	9.1	J	4.8	37.0	12.3
Dibenz(a,h)anthracene	1.5	J	0.64	J	1.6	J	1.4	J	0.69	J	0.97	J	0.6	3.6	1.3
Benzo(g,h,i)perylene	18		6.6	J	12	J	18	J	6.9	J	11	J	6.6	43.0	14.6

Data Qualifiers:

- **U** The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL
- **B** (metals) The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL
- **J** (organic)The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL
- **I** The MRL/MDL has been elevated due to a matrix interference
- **P** The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP pesticides)

The grain size distribution of surface sediment samples consisted mainly of fines (silt + clay) with an overall mean of 79.3 % fines. The single exception was Station 17, located along the southeast perimeter of the disposal site where sand (61.2%) comprised the major grain size fraction. Five of the Stations (50, 64, 92, 114, and 116) were predominately fines (91.2-96.6% fines), and represented the locations furthest from the disposal site perimeter and outside the apparent dredged material footprint. The remaining nine stations (6, 10, 13, 16, 19, 20, 23, 27, and 57) had a high proportion of fines (63.1 to 86.5 %) mixed with sand.

Total organic carbon (TOC) concentrations ranged from 0.9 to 3.1%. The lowest measured TOC concentration was at Station 13 located in the center of the disposal site, whereas the highest percentage TOC concentrations were recorded at Stations 64, 92, and 116 which comprise the southern- and western-most extent of the 2002 survey outside the apparent dredged material footprint.

Total sulfides were not detected in 8 of the 15 samples analyzed. Total sulfides were measured both within and outside the dredged material footprint. The detected concentration of total sulfides ranged from 4 to 41 mg/kg, with the highest concentration measured at Station 50, located to the northeast of the SF-DODS. Station 50 is at a water depth of 2100 meters and the SPI survey did not indicate the presence of dredged material.

Total solids ranged from 28.0 (Station 92) to 55.4 (Station 17) percent and total volatile solids measurements ranged from 3.9 (Station 17) to 11.1 (Station 92) percent. Station 92 is the northwestern most station sampled. Station 17 is located along the southeastern site perimeter. In general, the highest percent solids and lowest volatile solids were measured within the site perimeter and the lowest percent solids and highest volatile solids were measured at the furthest location from the disposal site. This pattern was generally consistent with distance from the disposal site.

5.2.2 Metals

Sediment samples were analyzed for ten metals, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc. All metals were detected at measurable concentrations for each sediment sample as summarized in Table 5-1. Maximum concentrations for metals were detected at three stations located within the apparent dredged material footprint, including Station 13 (arsenic and mercury), Station 20 (selenium), and Station 114 (cadmium, lead, silver, and zinc). Station 64, located

outside the dredged material footprint, had the highest measured concentrations for chromium, copper, and nickel.

5.2.3 Organic Compounds

Organic compounds analyzed in sediment samples from the 2002 monitoring survey included pesticides, PCBs, semi-volatile organic compounds (SVOCs), and miscellaneous organic compounds. Organic chemistry results are summarized in Table 5-1. Laboratory reports and data validation results are provided in Appendix B.

Pesticides

A total of 21 pesticides, listed in Table 5-1, were analyzed in sediment samples collected during the survey. Only four pesticides were detected and quantifiable (i.e., no qualifiers), including 4,4'-DDE at eleven stations (6, 10, 17, 19, 23, 27, 50, 57, 92, 114, and 116); Alpha-BHC at seven stations (6, 16, 17, 19, 27, 92, and 116); Gamma-BHC (Lindane) at one station (27); and aldrin at one station (6). Pesticides were detected in low concentrations at twelve of the fifteen stations sampled both within and outside the dredged material footprint. No discernable distribution pattern was observed for the detected pesticides.

Polychlorinated Biphenyls

PCBs, analyzed as Aroclors (including 1016, 1221, 1232, 1242, 1248, 1254, and 1260), were not detected (U) or quantified in low concentrations as estimates (J) in the SF-DODS sediment samples (Table 5-1).

Semi-Volatile Organic Compounds

The SVOCs analyzed for in sediment samples included seven low molecular polycyclic aromatic hydrocarbons (LPAHs) (naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, flourene, phenanthrene, and anthracene), ten high molecular PAHs (HPAHs) (fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene) and dibenzofuran. One or more PAHs were detected in eleven of the fifteen locations sampled. Three stations (6, 13, and 17), all within the dredged

material footprint, had measurable concentrations of at least eight HPAH compounds. Five PAH compounds were detected at Station 50, located outside the dredged material footprint, which was the only other location with more than three quantifiable PAHs. In general, the stations with detectable concentrations of PAHs were located within or relatively near the perimeter of the disposal site.

Organotins

Tri-n-butyltin (TBT) was detected in only one of the sediment samples collected during the 2002 monitoring survey (Table 5-1). The single detection of 4.2 ug/kg TBT was at Station 13 located in the center of the disposal site. This detection is well below the measured concentration (61 ug/kg) in the Oakland Outer Harbor dredged material that was approved for disposal at SF-DODS.

Miscellaneous Organic Compounds

Diesel range and residual range organics were not measured at quantifiable concentrations in any of the sediment samples. All results (Table 5-1) were qualified as undetected (U) or estimates (J).

5.3 Benthic Infauna Analysis Results

5.3.1 Station Locations

Fifteen stations were sampled for benthic infauna (Figure 5-13). These stations and their recorded depths are indicated in Table 5-2. Station 13 was located at the center of the disposal site; Stations 17, 19, and 23 were on the perimeter of the site, and the remaining stations were positioned outside the site along depth contours at increasing distances from the center of the site.

Table 5-2. Stations and depths at which box cores were taken at the SF-DODS in September 2002.

Station	Boxcore Depth (m)	Station	Boxcore Depth (m)
6	2697	27	2889
10	2739	50	2160
13	2902	57	2709
16	2693	64	3136
17	2775	92	2850
19	3000	114	2420
20	3050	116	2975
23	2954		

5.3.2 Infaunal Composition

A total of 405 species from eight phyla were identified from the 15 box core samples taken in September 2002 (Table 5-3; Appendices C and D). Most individuals, except some juvenile and/or severely damaged specimens, were identified at least to genus. As is typical for continental slope areas, the infauna was dominated by polychaete worms, which accounted for nearly half (47.7%) of the total number of species and included 193 species in 39 families. Paraonidae was the best represented family, with 26 species in five genera; one-half of these species (13) were in the genus *Aricidea*. Ampharetidae (16 species in nine genera), Cirratulidae (14 species in three genera), and Dorvilleidae, Maldanidae, and Spionidae with 12 species each, were also well represented.

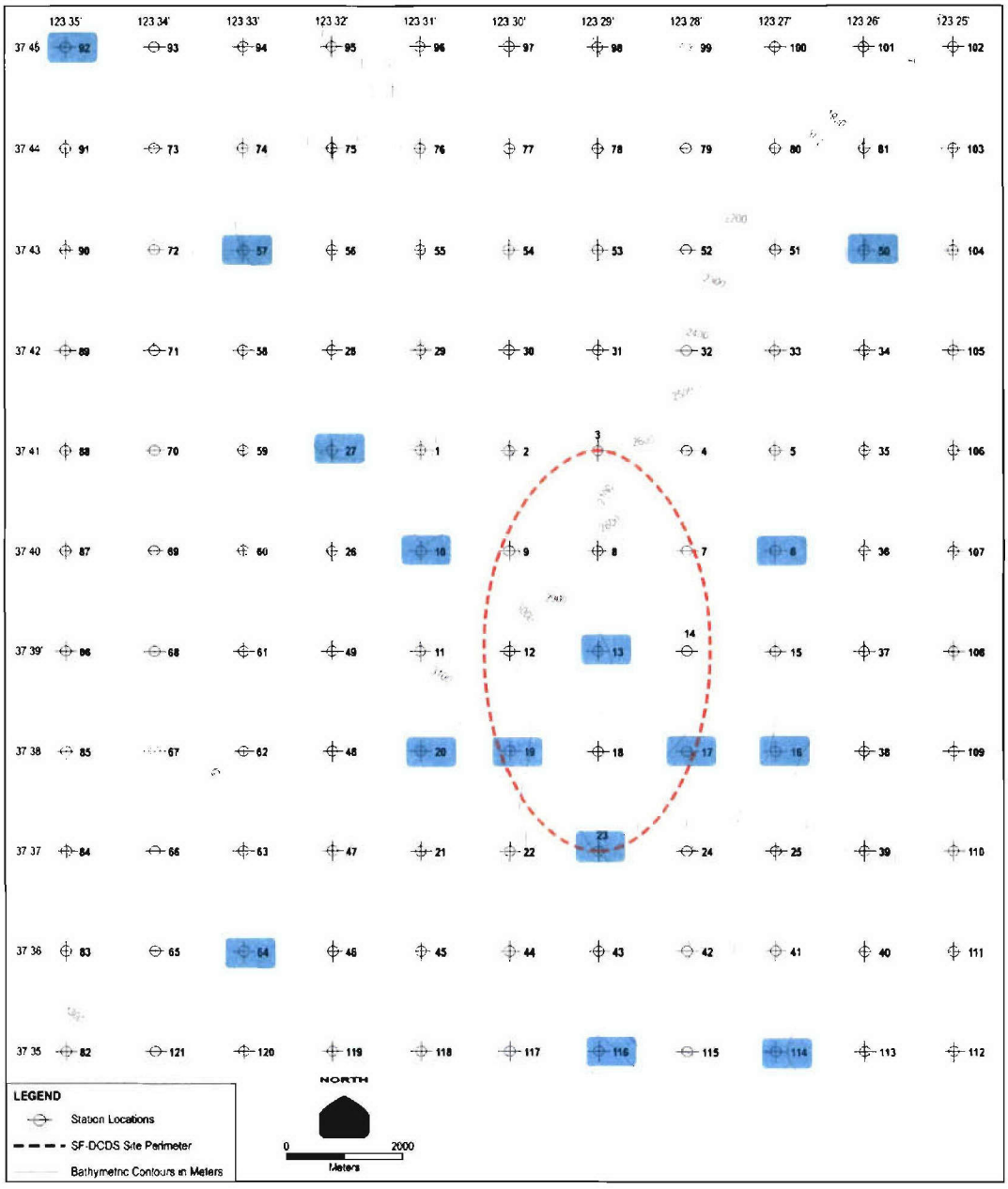


Figure 5-13. Map showing locations of box core stations from the SF-DODS sampled in September 2002. Blue shading indicates box core locations.

Table 5-3. Taxonomic summary of the benthic infauna collected at the SF-DODS in September 2002.

Phylum	Class	Total Number of Species Identified	Number of Unnamed Species[1]	Percent of Entire Fauna by Species
Coelenterata	Anthozoa	4	4	1.0
Nemertea		10	10	2.5
Annelida	Polychaeta	193	104	47.7
Pogonophora[2]		3	2	0.7
Sipuncula		1	0	0.2
Echiura		2	2	0.5
Mollusca				11.6
	Aplacophora	10[3]	10	2.5
	Bivalvia	28	14	6.9
	Gastropoda	7	6	1.7
	Scaphopoda	2	1	0.5
Arthropoda				31.6
	Amphipoda	37	25	9.1
	Cumacea	13	13	3.2
	Isopoda	48	45	11.9
	Tanaidacea	30	28	7.4
Echinodermata				4.2
	Echinoidea	1	1	0.2
	Holothuroidea	6	5	1.5
	Ophiuroidea	10	3	2.5
TOTAL		405	273	100

[1] Unnamed species include those that have been identified as close to (nr. or cf.) already described species, as well as damaged or indeterminate specimens.
[2] Pogonophora recently have been shown to be polychaetes.
[3] This number will increase when the Chaetodermamorpha are identified.

Arthropods were the second largest component of the infauna, accounting for 31.6% of the species. The isopod crustaceans were the dominant group with a total of 48 species in nine families, notably Desmosomatidae (20 species in seven genera), and Munnopsidae (11 species in seven genera). The amphipods were represented by 37 species belonging to 12 families. Phoxocephalidae was the best represented amphipod family with eight species belonging to two genera. The tanaidaceans included 30 species belonging to the typical deep-sea groups Typhlotanaidae (five species), Pseudotanaidae (five species), and Anarthruridae (18 species in 10 genera). The cumaceans, with 13 species belonging to four families, made up the remainder of the crustacean arthropods.

Molluscs (47 species) accounted for nearly 12% of the species recorded. Bivalves accounted for 60% of the molluscs and included 28 species in 11 families. The most prevalent bivalve family was the common continental slope family, Thyasiridae, with 12 species (43% of the bivalve species) belonging to five genera. The remaining molluscs were the aplacophorans (more than 10 species), gastropods (seven species), and scaphopods (two species).

Echinoderms (17 species) and nemerteans (10 species) each accounted for fewer than 5% of the species recorded. The largest echinoderm group was the Ophiuroidea with 10 species in three families; the largest ophiuroid family was the Ophiacanthidae (five species in three genera). The remaining smaller phyla (Coelenterata, Pogonophora, Sipuncula, and Echiura) were represented by a total of only 10 species and contributed only a small percentage (2.4%) to the total.

Of the 405 species found, 273 (67%) could not be assigned to an already described species. About 54% of the polychaetes remain undescribed, including numerous new species in the Ampharetidae, Cirratulidae, Dorvilleidae, Paraonidae, Phyllodocidae, Spionidae, and Trichobranchidae families. Of the 128 arthropod crustacean taxa, the majority (111 species) could not be assigned to known species; 94% of the isopods and 93% of the tanaids are undescribed. The molluscs, particularly the bivalves, are much better known, but over 66% of the taxa could not be named. Many of the echinoderms were unidentifiable juveniles and most of the nemerteans were faded and fragmented, making identification to the species level impossible.

5.3.3 Dominant Infaunal Species

Table 5-4 presents the dominant species when all the stations are considered together. Dominant species at each of the 15 stations are given in Appendix E. The aplacophoran mollusc taxon Chaetodermamorpha spp. may represent 8-10 individual species; in earlier studies in this area, *Spathoderma* sp. 1 was common at many stations, as was *Chaetoderma* sp. 1 (Blake et al., 1992). In the present study, this taxon accounted for a high percentage of the organisms at 14 of the 15 stations sampled, with Station 114 the only station where this taxon was not recorded. With the exception of this aplacophoran mollusc taxon, and a bivalve species dominant at Station 50 (see below), all of the top numerical dominants were polychaetes.

The narrow-bodied paraonid polychaete *Levinsenia flava* was a dominant at 13 stations; it ranked as the top numerical dominant at Stations 10, 20, 23, 27 (when Chaetodermamorpha spp. was not considered), and 92; it ranged from 5.1 to 13.7% of the fauna. Another paraonid polychaete, *Aricidea simplex*, dominated Stations 6 (8.5%), 16 (18.2%), 57 (12.5%) , and 114 (27.1%). It is noteworthy that this species, which often attains a very large size, accounted for such a high percentage of the infaunal communities at those stations where it was the top dominant, especially at Station 114.

Prionospio delta, a slim-bodied suspension/surface deposit feeder, was the numerical dominant at the central disposal site Station 13, where it accounted for 12.5% of the infauna. *P. delta* was also the top dominant at Station 64, with 13.6% of the fauna. An undescribed species of cirratulid polychaete, *Chaetozone* sp. 1, was the dominant at Station 17, where it accounted for 6.6% of the community. At Station 19, Chaetodermamorpha spp. was the most numerous taxon, but the polychaete *Cossura rostrata* was the dominant identified species.

At Station 50, which appears in several analyses to differ considerably from the other stations, the numerical dominant was a bivalve, *Mendicula ferruginosa*. This species also ranked second at Station 16, but otherwise was not common at any station.

Table 5-4. Dominant species at the SF-DODS stations sampled in September 2002.

Taxon	Total Individuals	Percent of Total Fauna
Chaetodermamorpha spp.	632	6.76
Levinsenia flava (polychaete)	571	6.11
Aricidea simplex (polychaete)	546	5.84
Prionospio delta (polychaete)	369	3.95
Cossura rostrata (polychaete)	324	3.46
Nemertea sp. A (*Carinomella*)	212	2.27
Chaetozone sp. 1 (polychaete)	208	2.22
Chaetozone sp. 4 (polychaete)	189	2.02
Aricidea sp. 4 (polychaete)	181	1.94
Maldanidae spp. indet. (polychaete)	180	1.92
Cossura modica (polychaete)	167	1.79
Mendicula ferruginosa (bivalve)	164	1.75
Chaetozone spinosa (polychaete)	154	1.65
Pettiboneia brevipalpa (polychaete)	137	1.46
Aricidea sp. 5 (polychaete)	120	1.28
Cirratulidae spp. indet. (polychaete)	118	1.26
Thyasiridae spp. indet. (bivalve)	118	1.26
Leptaxinus cf. minutus (bivalve)	116	1.24
Spiophanes kroyeri (polychaete)	115	1.23
Axinopsida sp. 1 (2002) (bivalve)	113	1.21
Thyasira flexuosa (bivalve)	113	1.21
Aricidea sp. 3 (polychaete)	112	1.20
Haploniscus sp. 1 (isopod)	101	1.08

At Station 13, located in the center of the disposal site, most of the organisms have very slender, elongated bodies. These are mostly polychaetes of the families Spionidae, Paraonidae, Cossuridae, and Opheliidae. In addition, this station is where an unusual, and at present totally unknown, capitellid polychaete was present. This species, identified only as "Capitellidae n. gen., n. sp. 1", is unusually thin and elongate, almost threadlike. Superficially these capitellids appeared to be oligochaetes until the setae were examined under a very high magnification. The significance of a site dominated by animals with very elongate and thin bodies is not known.

When the 15 stations are sorted according to their depths, we see that for stations from about 2850-3136 m depth that the most abundant and characteristics species are *Prionospio delta, Levinsenia flava, Cossura rostrata, C. modica*, and Nemertea sp. A. These five species are typically in all of the dominance lists for these stations and often among the most abundant. For Stations 6, 16, 17, and 57, at

depths of 2693-2775 m, the large paraonid *Aricidea simplex*, the cirratulid *Chaetozone* sp. 1, *Levinsenia flava* and other paraonids are characteristic faunal elements. Station 114 at 2420 m also shares most of these faunal elements. Station 50, the shallowest station at 2160 m, is dominated by the bivalve *Mendicula ferruginosa, Cossura rostrata*, and paraonids. From this, we can detect a general faunal shift from stations deeper than 2850 m where very thin-bodied worms such as *Prionospio delta* and *Levinsenia flava* predominate, to stations in the 2400-2700 m depth range where larger and more robust worms such as *Aricidea simplex* and *Chaetozone* sp. 1 become more important. These faunal shifts among the dominants accompany more important shifts in the larger faunal lists and account for zonation patterns observed in the pattern analyses.

5.3.4 Infaunal Density

The total number of individuals recorded in each sample is given in Table 5-5. The lowest densities were recorded at Station 13 in the center of the disposal site, where 272 individual organisms were found. The highest densities were recorded at Stations 16 and 50, with 1064 and 1179 individuals per box core, respectively. The remaining stations had densities that ranged from 433 to 711 individuals per sample, with Stations 19 and 20 at the lower end of the range and Station 17 at the higher end. Thus, all stations had roughly two to four times the density as that found at Station 13.

Table 5-5. Benthic community parameters for SF-DODS samples taken in September 2002.

Station	Total Indiv. ($0.1m^2$)	No. Valid Taxa (Total Taxa)[a]	H′ (base 2)	J′	BR	V	ESN 50	ESN 100	ESN150	ESN 200	ESN 300	ESN 500	LSA
6	601	90 (110)	5.34	0.82	3.45	0.83	27.4	40.7	50.3	58.0	70.5	89.8	31.96
10	648	106 (129)	5.64	0.84	3.63	0.84	30.0	46.0	57.5	66.8	81.8	104.5	40.43
13	272	57 (65)	4.82	0.83	3.04	0.83	24.2	36.2	45.0	51.8	0.0	--	23.17
16	1064	122 (143)	5.44	0.78	3.57	0.79	28.6	44.3	55.1	63.3	75.9	94.4	37.70
17	711	117 (135)	5.98	0.87	3.86	0.87	32.9	51.1	64.0	74.0	89.2	109.5	43.39
19	485	94 (114)	5.69	0.87	3.59	0.87	31.2	48.3	60.7	70.7	86.5	--	41.67
20	433	86 (102)	5.47	0.85	3.45	0.85	30.1	46.7	58.3	67.4	81.4	--	37.08
23	569	101 (115)	5.41	0.81	3.46	0.81	28.1	43.6	55.3	65.1	80.9	--	39.59
27	564	109 (123)	5.92	0.87	3.78	0.88	32.7	50.4	63.2	73.5	89.9	--	45.25
50	1179	153 (172)	6.19	0.85	4.05	0.86	33.8	53.2	67.1	78.0	94.7	118.1	51.08
57	464	111 (126)	5.89	0.87	3.72	0.87	33.2	53.0	67.4	78.8	96.7	--	50.96
64	536	100 (113)	5.37	0.81	3.42	0.81	28.2	44.7	57.3	67.5	83.8	--	41.05
92	548	83 (96)	5.05	0.79	3.25	0.79	25.7	39.6	49.6	57.6	69.5	--	29.04
114	590	107 (119)	5.08	0.75	3.25	0.75	27.0	43.7	56.4	66.6	82.4	103.8	40.02
116	688	95 (116)	5.43	0.83	3.51	0.83	28.4	42.8	52.9	60.9	73.4	91.7	33.36

a. Some taxa were deleted from the database before calculating the diversity measures. These taxa were those identified as "spp. indeterminant," and include damaged and/or juvenile individuals and most likely do not represent species other than those already identified from the samples. Such taxa are included in reported density values (total individuals).

5.3.5 Species Diversity and Evenness

The Shannon-Wiener diversity and Pielou's evenness values calculated for individual samples are presented in Table 5-5. This table also gives values for the Brillouin diversity index (HB) and its associated evenness value V; this index is similar to calculating H' at base e, which gives lower values than H' at base 2. The rarefaction results and log-series results are discussed in the next sections.

Shannon H' values ranged from a low of 4.82 at Station 13 to a high of 6.19 at Station 50, with the majority of values around 5.5. Evenness values, which indicate the degree to which a community is numerically dominated by one or a few species, ranged from 0.75 at Station 114, where *Aricidea simplex* accounted for 27% of the fauna, to 0.87 at Stations 17, 19, 27, and 57, where the top dominant accounted for 6.6 to 12.5 % of the fauna.

5.3.6 Rarefaction

Rarefaction curves for each of the 15 box cores are shown in Figure 5-14. These curves give a better indication of the differences in diversity among the stations. By this measure, Station 13 is again shown to have the lowest diversity of all the stations, while Station 57 slightly exceeds Station 50 as having the highest diversity. As evidenced by the fact that none of the curves reach an asymptote but continue to rise, the majority of stations appear to be slightly undersampled with only 0.1 m^2 of sediment analyzed. However, the shape of the curve for Station 13 suggests that this station would continue to have the lowest diversity, even with additional area sampled.

5.3.7 Log-Series Analysis

This analysis provides a means of examining the relationship between the Sanders' rarefaction curve for a particular sample and the log-series expectation for that sample. As Dr. Gallagher points out (personal communication, June 2001), "the log-series (distribution) provides a benchmark against which to judge the ... Sanders-Hurlbert rarefaction curve." A community whose rarefaction curve perfectly matches the log-series expectation would have a non-dimensional diversity curve that was a straight line at a value of 1. Departure from the log-series is considered to be indicative of recent disturbance (Gallagher, personal communication, June 2001) and may be related to periods of larval recruitment, when evenness values are low, as well as to natural or anthropogenic disturbances.

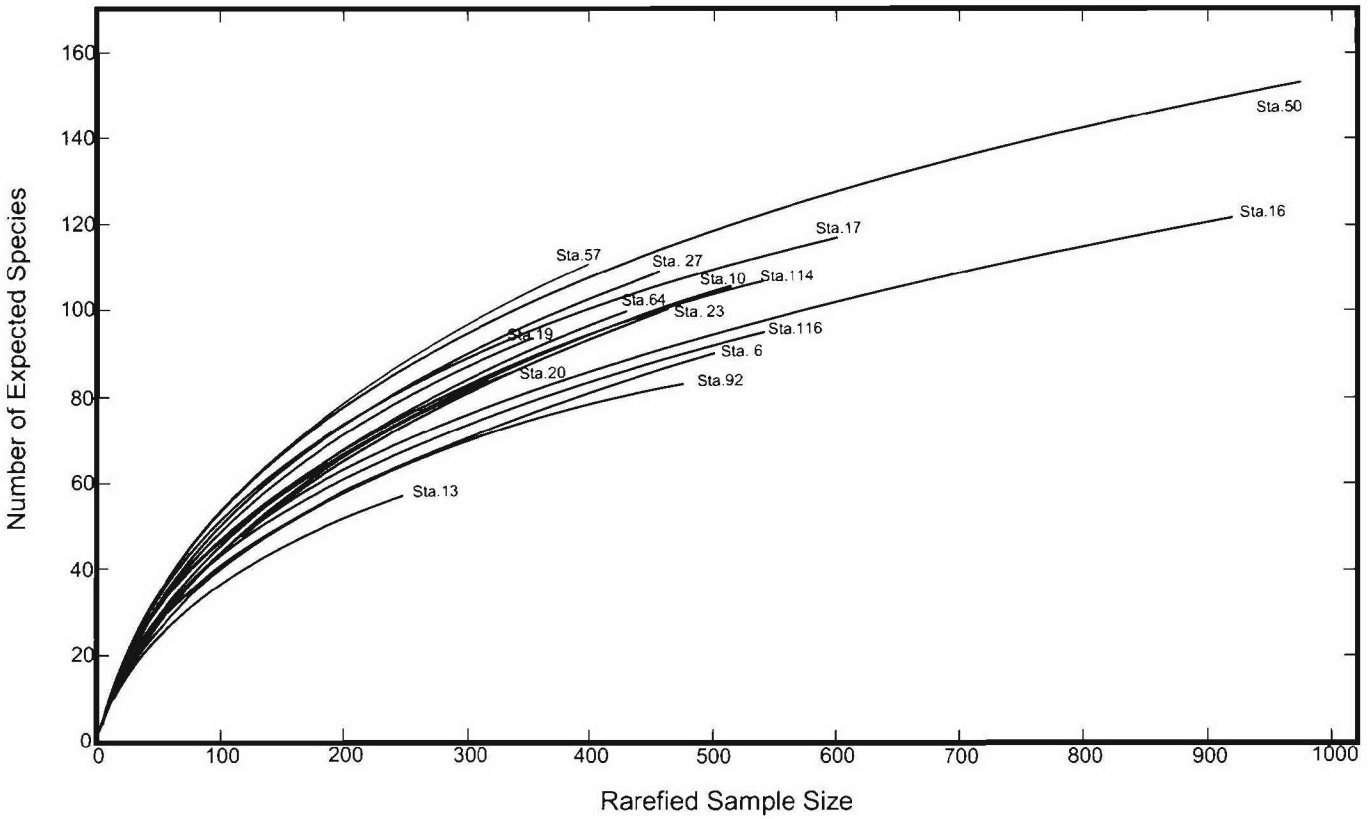


Figure 5-14. Rarefaction curves for each of the 15 samples analyzed from the September 2002 survey of the SF-DODS.

Figure 5-15 presents the non-dimensional diversity curves for the 15 SF-DODS stations. The curve for Station 17, which is on the perimeter of the disposal site, is closest to the ideal value of 1. The other stations show increasing departures from the ideal log-series expectation, with Station 114 showing the greatest discrepancy. At Station 114, the numerical top dominant was *Aricidea simplex*, which accounted for 27% of the fauna, an unusually high percentage for a deep-sea community. However, none of the curves approach the -0.75 level suggested by Gallagher to be indicative of a disturbed environment.

5.3.8 Community Assemblage Patterns (Cluster Analysis)

Cluster analysis was performed using the Bray-Curtis similarity algorithm as well as CNESS with *m* set at the optimal value of 32 (Figures 5-16 and 5-17). Both analyses showed that the stations group primarily according to depth intervals, with two or three major clusters. One group comprises Stations 6, 16, 17, and 57, all of which lie in depths of 2500-2700 m. In the Bray-Curtis analysis, Station 114 (2500 m) also clusters with these stations; whereas with CNESS, it clusters loosely with Station 50.

The largest cluster includes nine of the 10 or 11 remaining stations. Of these, five are in depths of 2700-2900 m, and are highly similar to one another with both clustering algorithms. Stations 19 and 20, at 3100 m depth, form a loose association with this group, and Stations 13 and 64, at 2900 and 3200 m, respectively, join the cluster, but a lower level of similarity. The remaining Station 50 at 2100 m, and (with CNESS but not Bray-Curtis), Station 114 at 2500 m are very different from all other stations. Station 50 is the shallowest station sampled and the most diverse.

Figure 5-18 is map showing the distribution of these station clusters. The depth gradient is well defined.

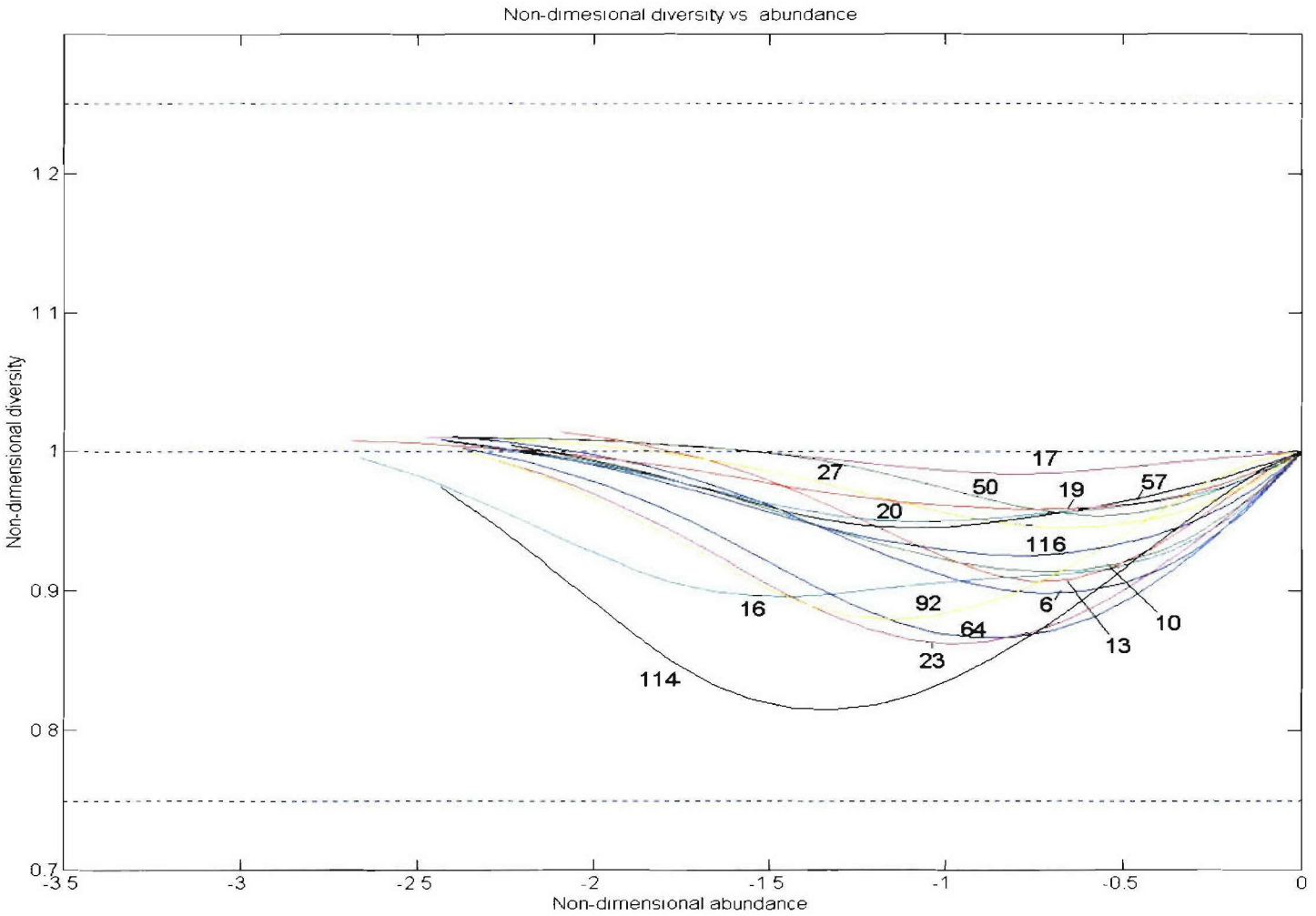


Figure 5-15. Non-dimensional diversity plot showing each station from the SF-DODS sampled in September 2002. The depth of each curve represents departure from an expected log series alpha. The dotted line at the bottom represents the –0.75 departure, which would represent a significant disturbance.

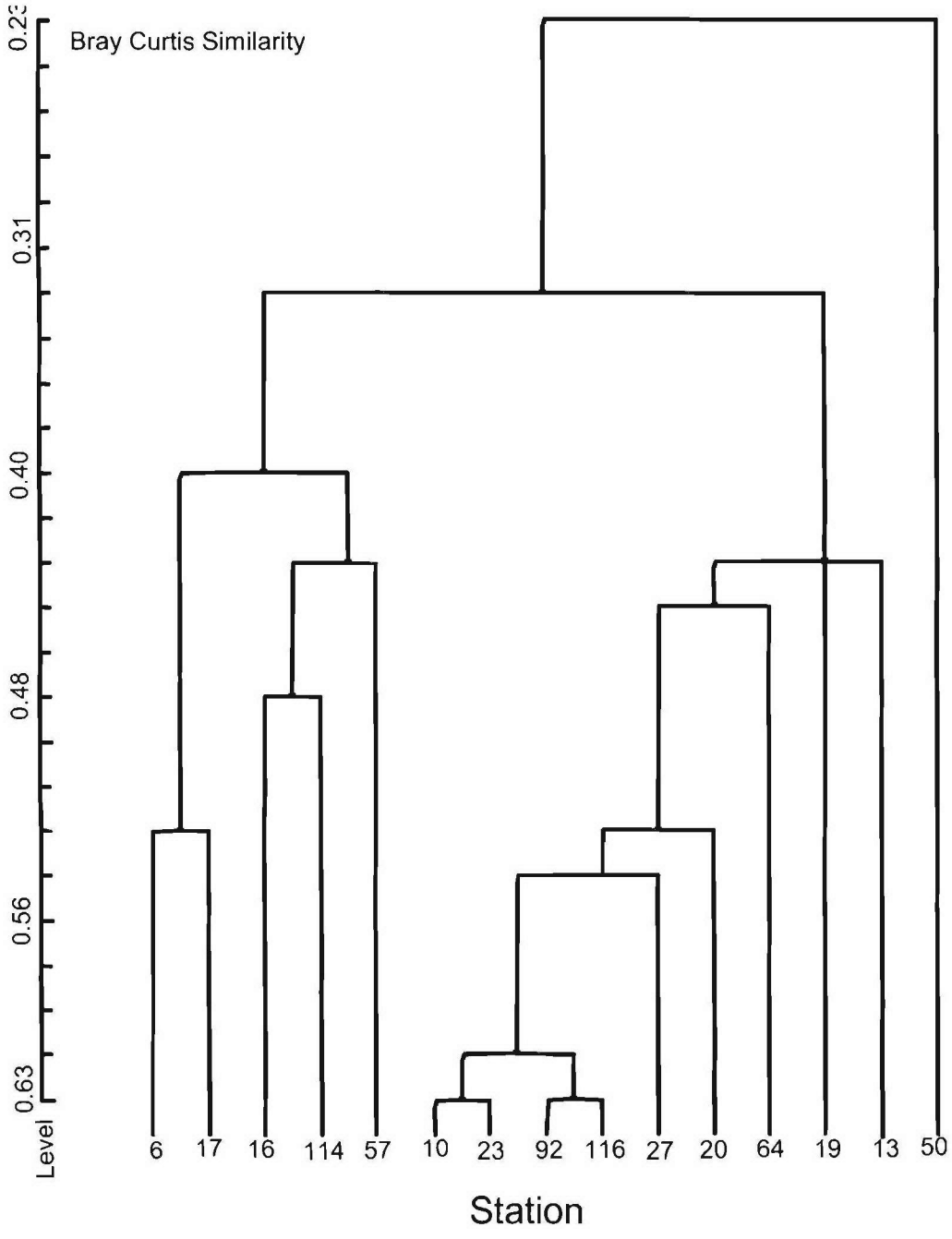


Figure 5-16. Dendrogram of 15 benthic infaunal stations sampled in 2002 at the SF-DODS. Clustering is with Bray-Curtis and Group Average Sorting.

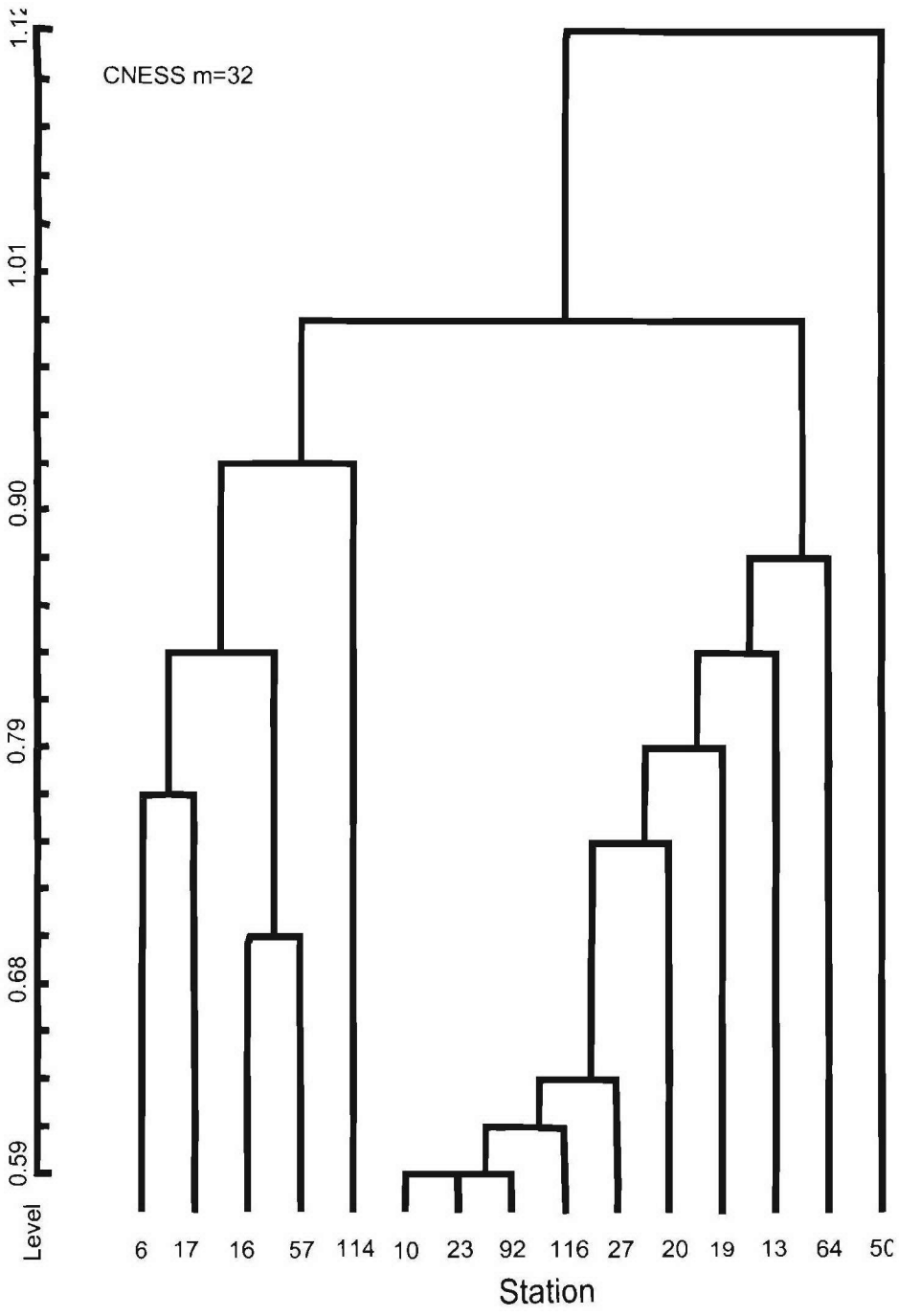


Figure 5-17. Dendrogram of 15 benthic infaunal stations sampled in 2002 at the SF-DODS. Clustering is with CNESS (m=32) and Group Average Sorting.

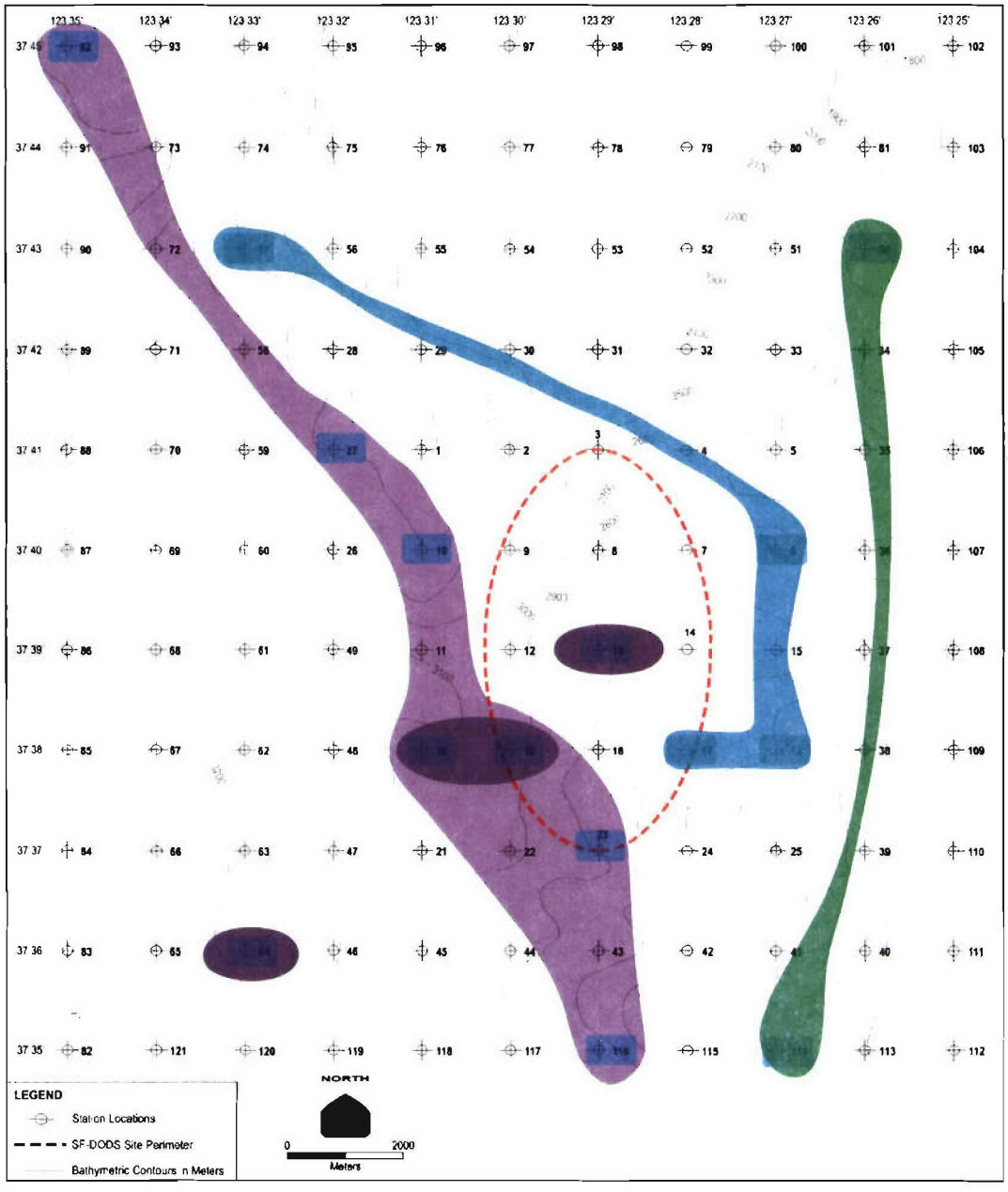


Figure 5-18. Map of the SF-DODS study area showing the distribution of major station clusters.

5.3.9 PCA-H Analysis

PCA-H analysis includes metric scaling of CNESS distances to compare samples, Euclidean distance biplots to show the relative importance of contributing species, and Gabriel covariance biplots to show the faunal assemblages. Of the six to nine axes considered in these analyses, axes one and two usually account for a high percentage of the variance.

The metric scaling of the 15 samples collected at SF-DODS stations is shown in Figure 5-19. This figure presents results only for axes 1 and 2. These two axes account for 28% and 12% of the variation, respectively. The results clearly demonstrate that Axis 1 represents a depth gradient. The very dense cluster of stations 10, 13, 19, 23, 27, 92, and 116 to the right of the center of the diagram corresponds to the cluster of highly similar stations illustrated for the cluster analysis results (Figure 5-17). These stations all occur between 2850-3000 m depth. Notice that Stations 20 (3050 m) and 64 (3136 m) occupy roughly the same position along Axis 1, but separate from the dense cluster of stations along Axis 2. These are the two deepest stations sampled and are clearly associated with the main cluster of stations. Stations 6, 16, 17, and 57 all range from 2690 to 2777 m depth and form a sequence along Axis 1 that directly corresponds to their depth with the deepest (17) being to the right and the shallowest (57) to the left. Station 50, in the upper left corner of the scaling plot, clearly differs from the other stations along both axes. At 2160 m, this is the shallowest station sampled in the survey. Station 114, at 2420 m, is the second most shallow station and appears intermediate between the shallower Station 50 and the deeper Station 57.

The Gabriel Euclidean distance biplot, shown in Figure 5-20, reveals 12 species (with red lines) that account for 2% of the variation in the first two PCA-H axes. The blue lines represent species, not indicated, that are important along other axes. The solid circles indicate the relative positions of stations as identified in Figure 5-19. The rank of the 12 species depicted here is shown in Table 5-6. The length of the vector associated with a species indicates its relative importance in accounting for these differences. Species with the longest vector should have the most influence in defining similarity between stations. Seven species identified on the right side of the diagram account for the large group of

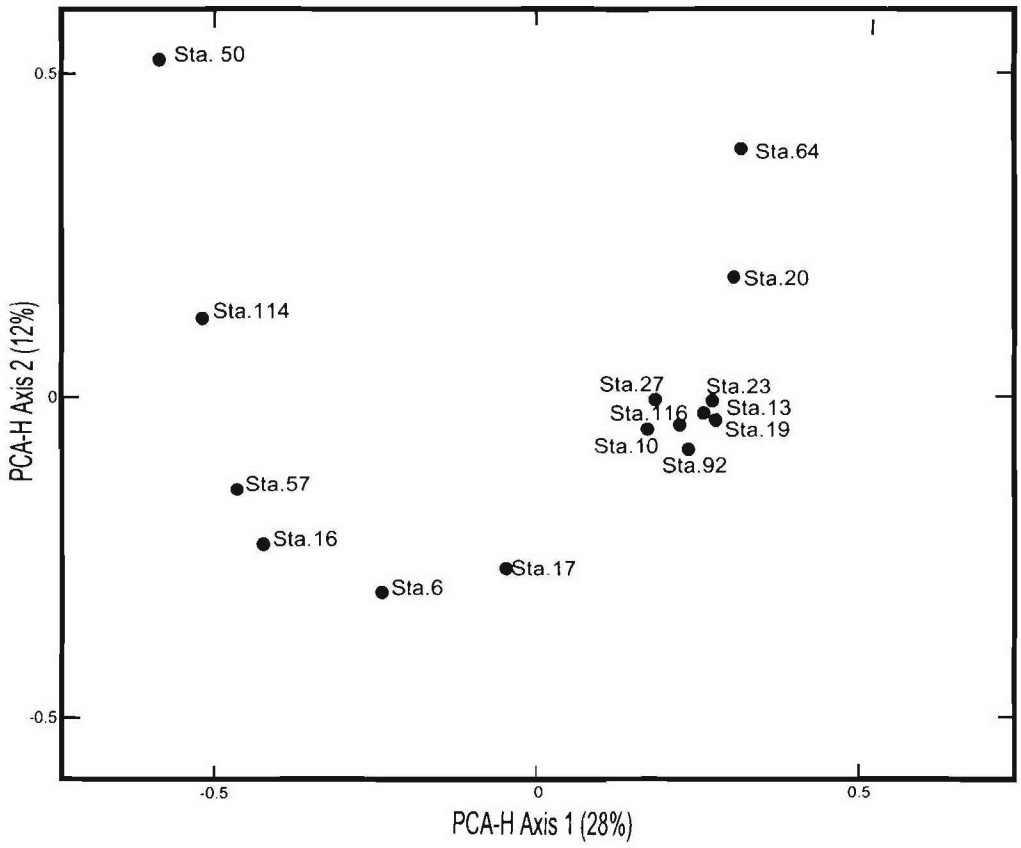


Figure 5-19. Metric scaling of CNESS (NESS m=32) distances among 15 samples from 2002 among axes 1 and 2.

stations that are zoned deepr than 2850 m. Of these, *Prionospio delta* has the longest vector and is clearly important in defining this group of stations. The bivalve molluscs *Mendicula ferruginsosa* and *Thyasira flexuosa* are very likely the most important species in accounting for the separation of stations 114 and Station 50, but these stations may also be influenced by species along other axes (not shown). These bivalves do not occur in faunal assemblages with *P. delta.*

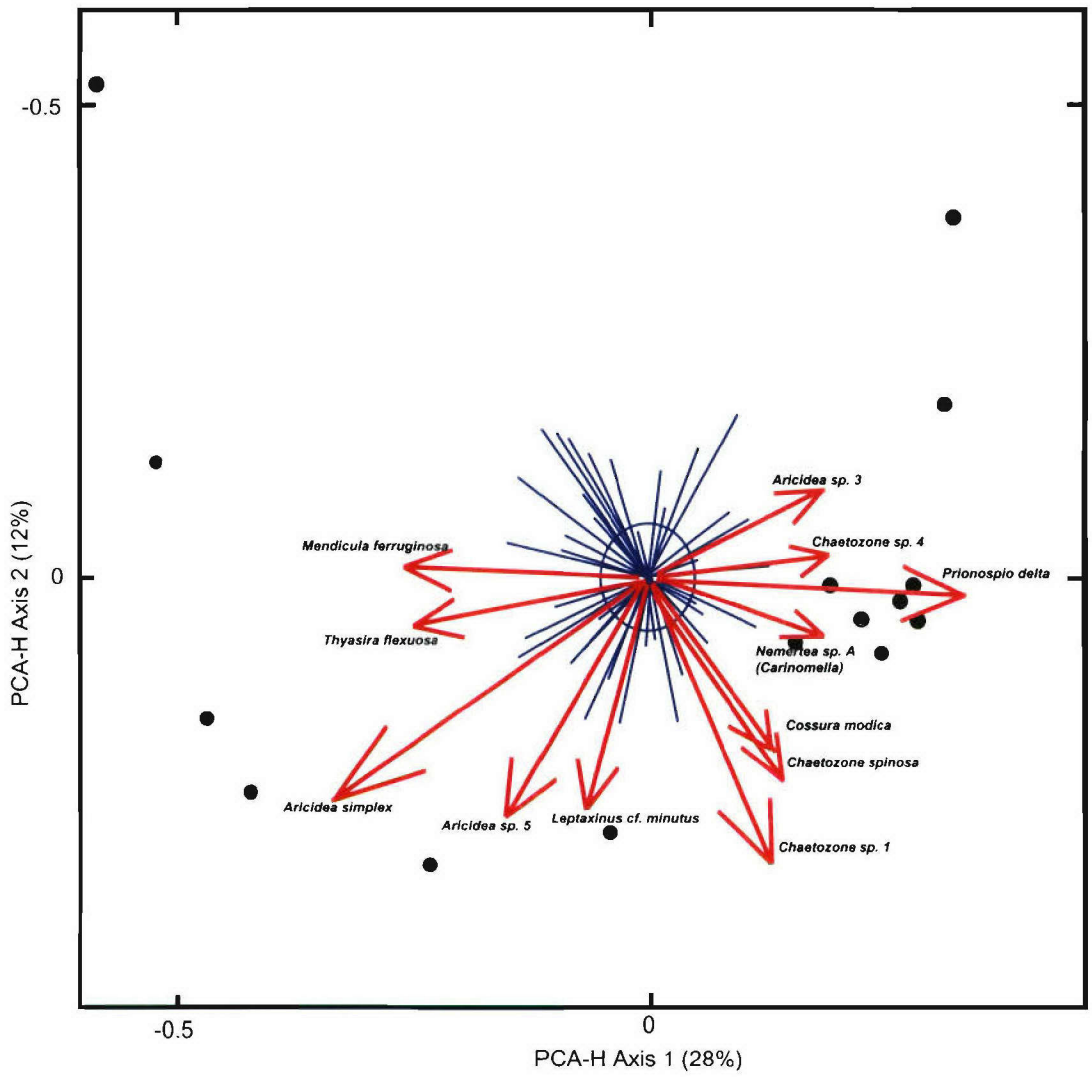


Figure 5-20. Gabriel Euclidean Distance Biplot of the same stations on axes 1 and 2 showing 12 species that account for 2% of the variation. Black circles indicate the 15 Stations; red arrows indicate the 12 species; blue lines indicate species that account for variation on other axes.

Table 5-6. Comparative ranks of species contributing the most variation (> 2%) to CNESS distances for the SF-DODS samples collected in September 2002.

Rank	Species (code number on covariance biplot)	Axis 1	Axis 2
1	*Aricidea simplex* (50)	11	5
2	*Prionospio delta* (333)	11	0
3	*Mendicula ferruginosa* (224)	7	0
4	*Thyasira flexuosa* (388)	6	0
5	*Chaetozone* sp. 1 (90)	2	9
6	*Aricidea* sp. 5 (57)	2	7
7	*Chaetozone spinosa* (94)	2	5
8	*Chaetozone* sp. 4 (91)	4	0
9	*Aricidea* sp. 3 (55)	3	1
10	Nemertea sp. A (*Carinomella*) (255)	3	0
11	*Leptaxinus* cf. *minutus* (192)	0	6
12	*Cossura modica* (106)	2	3

The covariance plot for the 405 species identified from the SF-DODS samples is shown in Figure 5-21. The cosine of the angle between the species vectors indicates whether the species co-occur or are found in different faunal assemblages. For example, the vector for species 333 (*Prionospio delta*) is 180° from the vector for the bivalves *M. ferruginosa* (224) and *T. flexuosa* (388), implying that they are found in different assemblages. Three or four faunal groups can be identified from this analysis (Figure 5-21, Table 5-7). Approximately 170 species are associated with faunal group 1, which is characterized by *Prionospio delta* (333); these species have a fairly tight association. Group 2, characterized by *Aricidea simplex* (50), comprises approximately 120 species, again with notably close associations. Groups 3a and 3b are a loose association of 26 and 72 species, respectively. Group 3a includes *M. ferruginosa* (224), the top dominant at Station 50, as well as *T. flexuosa* (388). Group 3b includes the bivalve *Yoldiella* sp.1 (404) and the polychaete *Prionospio nr. Steenstrupi* (335). Of the remaining species, several are somewhat isolated on the plot (e.g., *Braniella* sp. 1 (77) and *Levinsenia* sp. 3, (202) which plot between faunal groups 1 and 2; and *Exallopus* sp. 1 (141) and *Flabelligella* sp. 1 (145), which plot between faunal groups 1 and 3b.

5.3.10 Sediment Texture and TOC

Total organic carbon was uniformly low at all stations (Figure 5-22), with values ranging from 0.90% at Station 13 to 3.09% at Station 64. Percent fines (silt plus clay) were lowest at Station 17 (39.5%), but were over 90% at five stations, and between 60 and 90% at the remaining stations.

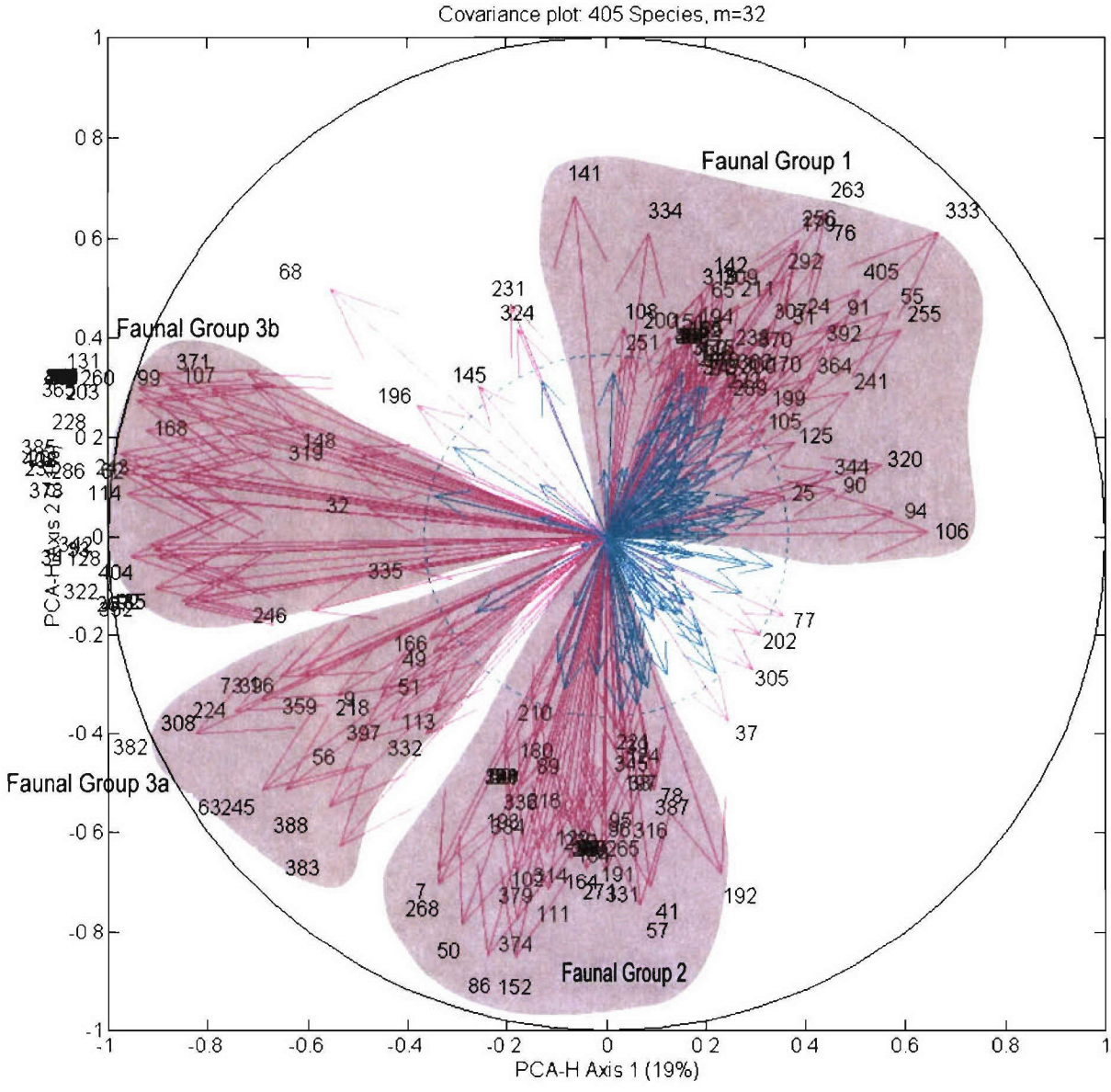


Figure 5-21. Covariance plot of the September 2002 data on Axes 1 and 2 showing all 405 species identified.

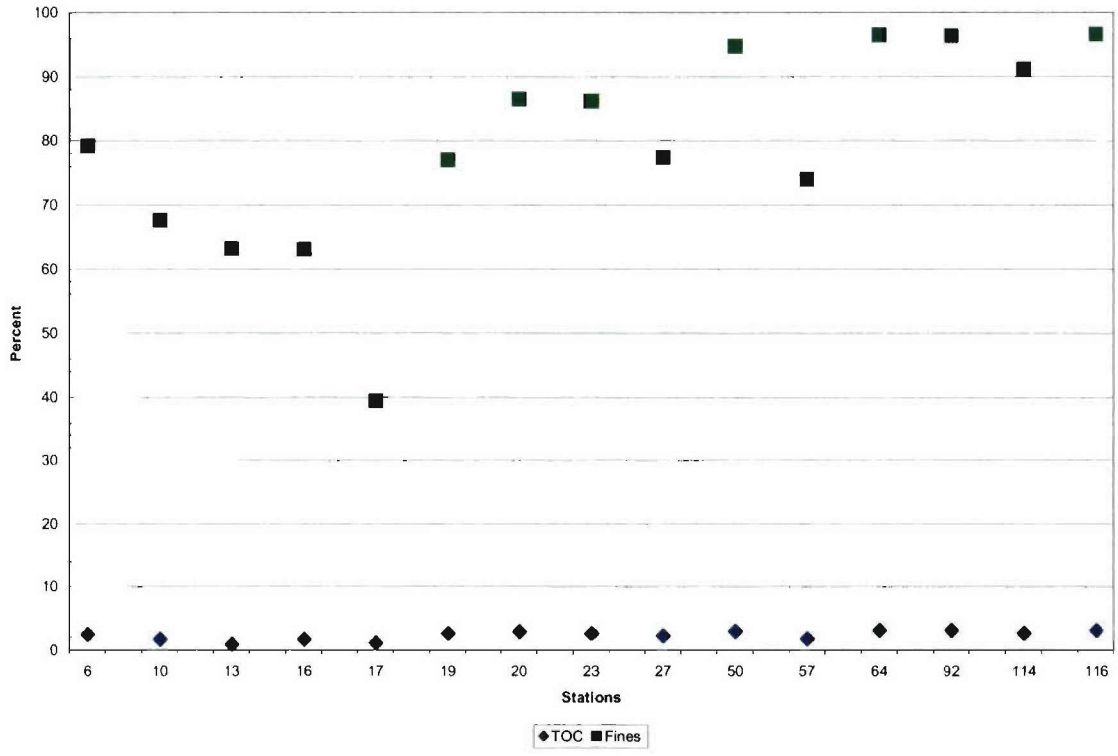


Figure 5-22. Plot showing percent fines (silt + clay) and total organic carbon at 15 stations sampled as part of the September 2002 SF-DODS survey.

Table 5-7. Representative species composition of faunal assemblages based on PCA-H loadings (Numbers in parentheses refer to code number on figure).

Species	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
Faunal Assemblage 1 (This group has positive loadings on axis 1 and axis 2)						
Prionospio delta (333)	0.6675	0.6114	0.0007	0.172	-0.079	-0.1087
Cossura modica (106)	0.6461	0.0087	0.2593	-0.264	-0.0205	-0.5705
Nemertea sp. A (*Carinomella*) (255)	0.5923	0.4162	0.3429	0.3484	0.2205	-0.117
Chaetozone spinosa (94)	0.5760	0.0467	0.4722	-0.2311	-0.0949	-0.0098
Aricidea sp. 3 (55)	0.5684	0.4516	-0.3685	-0.2429	0.1639	0.0134
Pettiboneia brevipalpa (320)	0.5531	0.1445	0.1971	0.4173	0.3018	-0.0143
Ypsilothuria bitentaculata (405)	0.5092	0.4961	0.2403	-0.2656	0.3908	0.0709
Mystides rarica (241)	0.4886	0.2911	0.5039	-0.0789	0.2719	-0.2838
Chaetozone sp. 4 (91)	0.4665	0.4300	-0.0065	-0.2099	-0.1585	0.1333
Chaetozone sp. 1(90)	0.4588	0.0945	0.4286	0.3863	-0.4735	0.1543
Protankyra nr. Abyssicola (344)	0.4504	0.1299	0.1848	-0.2109	-0.2226	0.3806
Neonotomastus glabrus (263)	0.4415	0.6495	-0.082	-0.2159	0.2372	-0.0469
Braniella palpata (76)	0.4386	0.5683	-0.2923	-0.0587	-0.0302	0.1494
Thyasiridae sp. 1 (392)	0.4359	0.3811	0.1424	-0.2712	0.0879	-0.2548
Sige brunnea (364)	0.4182	0.3209	-0.1567	0.3050	-0.0367	-0.2162
Amphiura diomedeae (24)	0.3880	0.4311	0.5379	-0.1472	0.2830	0.2957
Neoheteromastus lineus (256)	0.3874	0.5969	-0.2073	-0.2828	0.5063	-0.1133
Labidoplax nr. buski (179)	0.3844	0.5868	-0.1093	-0.2167	0.3296	0.2223
Ehlersileanira sp. 1 (125)	0.3798	0.1902	-0.0945	0.1404	-0.1966	-0.5852
Ophiacantha normanii (292)	0.3587	0.5174	0.0119	-0.2728	0.5721	-0.0179
Ancistrosyllis groenlandica (31)	0.3579	0.4124	-0.0233	0.0804	0.4799	-0.1887
Anarthrurinae sp. 1 (25)	0.3571	0.0804	0.3827	0.0190	0.0649	-0.3715
Paragathotanais sp. 1 (307)	0.3301	0.4222	-0.0387	-0.1985	0.3771	-0.1685
Levinsenia flava (199)	0.3269	0.2610	-0.3439	0.5633	0.2652	-0.3917
Ilyarachna cf. acarina (170)	0.3189	0.3225	-0.1010	-0.0511	-0.2117	0.1936
Cossura brunnea (105)	0.3184	0.2154	-0.1408	0.0179	-0.1073	0.0979
Faunal Assemblage 2 ***(This group has either positive or negative loadings on axes 1 and 2, and negative loadings on axis 2)***						
Aricidea sp. 5 (57)	0.0697	-0.7457	0.0171	-0.0652	-0.1212	0.1497
Aphelochaeta sp. 8 (41)	0.0897	-0.7106	0.139	-0.2903	-0.4044	-0.0526
Leptaxinus cf. minutus (192)	0.2305	-0.6808	0.2925	0.2762	-0.1375	-0.135
Parougia sp. 1 (316)	0.0542	-0.5566	-0.1349	-0.1331	0.0797	-0.3423
Thyasira cf. cygnus (387)	0.0968	-0.5148	-0.0222	-0.5027	-0.0859	-0.5019
Bruzelia tuberculata (78)	0.0976	-0.4909	0.0733	-0.6442	-0.1078	-0.0032
Aphelochaeta sp. 10 (38)	0.0344	-0.4677	-0.1224	-0.5438	-0.0198	-0.4293
Leucon (Crymoleucon) sp. 2 (197)	0.0344	-0.4677	-0.1224	-0.5438	-0.0198	-0.4293
Pseudarachna sp. 1 (345)	0.0163	-0.4324	-0.1342	0.0334	0.1573	-0.2096
Edwardsia sp. 3 (124)	0.0387	-0.4175	-0.3414	-0.7633	-0.1732	0.1638
Glyphanostomum pallescens (152)	-0.1823	-0.8516	-0.351	-0.2082	0.2065	0.1178
Ceratocephale pacifica (86)	-0.2404	-0.8505	-0.0257	-0.1285	-0.0538	0.1532

Table 5-7. Representative species composition of faunal assemblages based on PCA-H loadings (Numbers in parentheses refer to code number on figure) (Continued).

Species	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
Aricidea simplex (50)	-0.2912	-0.7854	-0.0142	0.1173	-0.0781	0.2901
Sphaerodoropsis sp. 7 (374)	-0.1802	-0.7737	-0.3995	-0.1907	0.2834	0.0048
Deminucula nr. atacellana (111)	-0.1176	-0.7157	-0.2314	-0.1581	0.2185	0.2835
Ninoe sp. 1 (268)	-0.3384	-0.7039	-0.3622	-0.0527	0.3725	-0.0787
Spiophanes kroyeri (379)	-0.1800	-0.6813	-0.1536	-0.0109	0.4268	-0.1003
Potamethus mucronatus (331)	-0.0002	-0.6771	-0.1419	-0.3634	0.1048	-0.3166
Adontorhina lynnae (7)	-0.3384	-0.6730	0.1129	-0.3815	-0.0572	0.0165
Notomastus lineatus (271)	-0.0402	-0.6728	-0.0764	-0.5678	-0.2290	0.0490
Faunal Assemblage 3a ***(This group has negative loadings on both axis 1 and axis 2)***						
Terebellides sp. 2 (383)	-0.5373	-0.6277	-0.1411	-0.0266	0.1339	0.3137
Thyasira flexuosa (388)	-0.5563	-0.5469	-0.0084	0.2893	-0.0469	0.0171
Austrotindaria gibbsi (63)	-0.6911	-0.5147	-0.3004	-0.2138	0.2069	-0.0343
Neilonella mexicana (245)	-0.6456	-0.5137	-0.2012	-0.4058	0.0748	-0.1148
Aricidea sp. 4 (56)	-0.5017	-0.4189	0.0748	0.0888	0.0057	-0.1353
Praxillella gracilis (332)	-0.3644	-0.4019	-0.3228	0.5139	0.5176	0.1853
Terebellides sp. 1 (382)	-0.8254	-0.3994	-0.0322	-0.0314	-0.0773	0.1405
Trichobranchus sp. 1 (397)	-0.4336	-0.3740	-0.3120	0.5021	0.5059	0.1779
Paralysippe annectens (308)	-0.7457	-0.3543	-0.2070	0.3309	0.2599	0.0835
Desmosoma sp. 1 (113)	-0.3430	-0.3520	-0.7281	-0.3680	-0.0965	0.0143
Mendicula ferruginosa (224)	-0.6940	-0.3290	0.1283	-0.2317	-0.2955	0.0055
Faunal Assemblage 3b ***(This group has negative loadings on axis 1 and either positive or negative loadings on axis 2)***						
Yoldiella sp. 1 (404)	-0.8486	-0.0692	-0.0399	-0.4501	-0.1172	-0.148
Prionospio nr. steenstrupi (335)	-0.3970	-0.0677	0.2982	-0.5525	-0.0815	0.1591
Eranno sp. 1 (128)	-0.9030	-0.0416	-0.1990	-0.3354	-0.1151	-0.0592
Anobothrus sp. 3 (34)	-0.9548	-0.0395	-0.1197	0.1235	0.1982	0.0233
Anobothrus sp. 2 (33)	-0.9098	-0.0259	-0.1288	0.2568	0.2602	0.0638
Proclea cf. graffi (342)	-0.9162	-0.0161	-0.1228	0.2482	0.2515	0.0602
Sphaerodoropsis biserialis (371)	-0.7195	0.3288	0.1857	-0.0267	-0.0306	0.1503
Cossura pygodactylata (107)	-0.7099	0.3030	-0.1277	-0.1365	-0.3168	0.1083
Hesionidae sp. 2 (168)	-0.7576	0.2046	0.3347	0.0675	-0.2954	-0.1367
Genitoconia sp.? (148)	-0.5092	0.1811	0.1722	0.0096	-0.0779	-0.4069
Solemya sp. 1 (368)	-0.3089	0.1809	0.1763	-0.0343	0.0122	-0.2709
Tharyx kirkegaardi (385)	-0.9776	0.1673	-0.0033	0.0711	0.0736	-0.011
Pettiboneia bathyalis (319)	-0.5306	0.1557	-0.0704	0.2634	-0.2813	0.0329
Amphicteis vestis (20)	-0.9766	0.147	-0.0172	0.0922	0.0948	-0.0028
Yoldiella nr. minuscula (402)	-0.9765	0.145	-0.0185	0.0942	0.0968	-0.002

6.0 DISCUSSION

6.1 Physical Monitoring (SPI Survey)

6.1.1 Dredged Material Distribution

In 2002, a total of 721,890 cubic yards of dredged material from San Francisco Bay was disposed at the SF-DODS. The September 2002 monitoring survey focused on collecting SPI data from the SF-DODS boundary and stations outside of the site to delineate the overall perimeter of the dredged material deposit. This delineation strategy allowed collection of sediment samples to better assess the differences between impacted and unimpacted areas. A distinctive layer of new dredged material related to 2002 disposal was not observed at stations monitored during this year's survey, with the possible exception of Station 19 located along the southwest site perimeter. Station 19 appeared to show the presence of light gray clay chips and fine sand in the upper 3 cm of the sediment column that appear to be of recent origin (Figure 5-4).

Dredged material identified at the flanks of the disposal footprint appears to be older, showing minimal to extensive mixing with ambient sediments. The deep camera prism penetration at these locations indicates low sediment bearing strength and confirms that the dredged material is well mixed in the sediment column (Figure 5-9). The overall distribution of dredged material near the perimeter of the disposal site and along the flanks of the footprint is similar to the dredged material footprint measured in 2001. Based on observations from the September 2002 monitoring survey, recent dredged material (disposed in calendar year 2002) appears to be confined within the SF-DODS site perimeter.

In 2001, stations to the northwest of the disposal site perimeter (2, 27, 29, 59, 60, 56) showed the presence of dredged material thickness greater than 5 cm. In 2002, stations 2 and 27 were reoccupied. Station 2 showed a similar thickness in dredged material (5.5 cm in 2002 versus 5.3 cm in 2001). Mean dredged material thickness at Station 27 was 3.5 cm in 2002 versus 5.4 cm in 2001. The apparent decrease in dredged material thickness at Station 27 may be due to variability in sampling locations between years (within station variability) or possible erosion or down-slope movement of dredged material. SPI images from Station 27 show physical bottom roughness with mud clasts present on the sediment surface.

Station 10, located near the northwest perimeter of the SF-DODS showed a mean dredged material thickness of 10.9 cm. This relatively thick measurement is due to downward mixing of dredged material observed in

Replicate A due to bioturbation (Figure 5-2). In 2001, Station 10 showed a mean accumulation of 4.7 cm of dredged material. A conservative interpretation of the Tier 1 annual threshold of five centimeters of accumulation suggests an exceedance. However, measurement of discrete dredged material layers is no longer straightforward due to the difficulty in distinguishing new dredged material and older material disposed of in prior years. Downward mixing of dredged material due to bioturbation further complicates identification and leads to an overestimate of the initial thickness of the dredged material layer. Dredged material observed at Station 10 appears to be older, with evidence of downward mixing and a Stage III benthic community established at the site. Downward mixing is particularly extreme in Replicate A. If this image is not included in the mean thickness measurement, the total dredged material thickness is 8.5 cm, which would not exceed the Tier 1 annual threshold (i.e., 3.8 cm of dredged material accumulated in 2002).

This example shows the difficulty in interpreting the annual measurement of dredged material thickness at the SF-DODS, which has prompted the U.S. EPA to revisit the Tier 1 monitoring annual threshold for initiating the next tier of monitoring. Potential impacts of dredged material disposal can be assessed by conducting infaunal community analysis of benthic samples collected within and outside of the deposit footprint.

Earlier studies have concluded that the trough axis running along the center of the SF-DODS is largely depositional and that the slopes may experience periodic erosion and slumping (SAIC, 1991). Slope sediments can be set into motion by earthquakes, internal waves, or downwelling sediment and/or water (Chin et al., 1992; SAIC, 1992b). Slope erosion was evident during the September 2002 survey, as indicated by the presence of "stranded" tubes, mud clasts, and high boundary roughness (Figure 5-6). This suggests that dredged material and ambient slope sediment (and associated organisms) at the SF-DODS may experience some passive redistribution and/or *in-situ* burial.

6.1.2 Consolidated Clay at SF-DODS

Similar to previous surveys, some stations in the vicinity of the SF-DODS showed a layer of ambient sediments overlying a blue-gray clay that may be historical dredged material (stations 50, 57, 110, and 130). These stations are located on the upper slope, above the trough axis where the SF-DODS is located. However, baseline studies at the EPA-1 reference station in shallower water (1200 m) observed similar stratigraphy (ambient sediments over blue cohesive clay). It was suggested that the blue clay may be an old natural sedimentary deposit outcropping along the continental slope with only a thin interval of modern muddy

sediment accumulating on top of the blue clay (SAIC, 1991). At some of the SF-DODS stations, a sharp contact is observed between these sedimentary layers, suggesting that the blue clay observed near the SF-DODS may also be an outcrop of a natural sediment deposit. A considerable temporal hiatus in sedimentation should exist between the blue clay and overlying ambient sediments. This relationship could be assessed in a future monitoring survey by conducting radioisotope dating of the consolidated blue-gray clays or through close examination of the sedimentary fabric using x-radiographs.

6.1.3 Apparent RPD Depths

Mean apparent RPD depths at the SF-DODS during the September 2002 monitoring survey had a major mode between 4.0 and 4.5 cm, which is deeper than pre-disposal baseline RPD depths with a major mode of 2.5 to 3.0 cm (SAIC, 1991). The apparent increase in RPD depths may be due to difficulties by the computer image analysis system in identifying the RPD in sediments with little to no color contrast (clay), rather than an increase in the depth of oxygenation at the SF-DODS. Conversely, the recent accumulation of turbidites could result in deeper apparent RPD depths (see Section 5.1.4). Whether the deeper apparent RPD depths are real or an artifact of the image analysis system, surface sediments in the vicinity of the SF-DODS are well mixed and have experienced recent exposure to oxic conditions either through bioturbation (irrigational pumping) by infauna or recent accumulation of turbidites. Deep infaunal deposit feeding organisms (Stage III) are present at nearly all stations at the SF-DODS. The benthic community appears adapted to sediment instability in this dynamic deep-sea environment, and therefore resilient to physical disturbance by dredged material disposal.

6.2 Sediment Conventionals and Chemistry

The data results of the September 2002 survey were compared to data from previous surveys of the site, including baseline studies conducted in 1990 and 1991 (SAIC 1991, 1992a), as well as monitoring surveys conducted between 1996 and 2000 (SAIC, 1996, 1999a, and 1999b; Tetra Tech 1999, 2000, and 2001). Results were also compared to dredged material characterization results from navigational maintenance and deepening projects in Richmond Inner Harbor (1995-2002), Oakland Inner Harbor (1994-2001), and Oakland Outer Harbor (1994-1999). A summary of the range of conventional and chemical results for the monitoring surveys and dredged material characterizations is presented in Table 6-1. Graphical depictions of the ranges of selected conventional and chemical concentrations between the September 2002 survey and baseline, previous monitoring studies, and dredged material characterizations are presented for comparison in Figures 6-1 through 6-5.

Sediment conventionals measured in SF-DODS surface sediments have undergone subtle changes when compared with the results of the baseline surveys (Table 6-1, Figure 6-1), likely due to the deposition of dredged material. The percentage of total solids has increased from baseline results, but is similar to the ranges found in previous monitoring events and dredged material characterizations. Conversely, the percentage of fines (silt & clay) and TOC have decreased from the initial baseline results but demonstrate similar ranges to the previous monitoring events and dredged material characterizations. These results are consistent with the deposition and dispersion of coarser grained, low TOC dredged material at and in the vicinity of the disposal site. The lower porosity of coarse-grained material and relative compaction of dredged material deposition relative to natural deep-sea deposition likely account for the differences measured in total solids. This relationship between grain size, TOC, and total solids is further supported by a strong positive statistical correlation between fines and TOC (0.920) and strong negative correlation between fines and total solids (-0.941).

All metals analyzed were detected at quantifiable concentrations in every sediment sample collected during the 2002 survey. Graphical comparisons of the ranges of metals concentrations for the 2002 survey and previous investigations are presented in Figures 6-2, 6-3, and 6-4. However, none of the detected metals were measured at notably elevated concentrations relative to the baseline surveys. Only two metals, lead and cadmium, were measured at concentrations slightly above the baseline results, but were both below the maximum concentrations measured in previous monitoring surveys and dredged material characterizations. The reported concentrations for arsenic, chromium, copper, nickel, and selenium for the 2002 survey were all lower than the baseline results, and were also lower or similar to concentrations reported in the other investigations. Mercury, silver, and zinc were all detected at concentrations similar to baseline but less than concentrations reported during the monitoring surveys and dredged material characterizations. Therefore, the 2002 data results indicate that metals at the locations sampled are not at concentrations of concern.

Two pesticides, alpha-BHC and 4,4'-DDE, were detected at multiple locations during the 2002 monitoring survey within and outside the perimeter of the disposal site. Pesticides (DDT and dieldrin) were not detected or were not available (alpha-BHC) from the baseline investigations. The compounds dichlorodiphenyl-dichloroethane (DDD) and dichlorodiphenyl-dichloroethene (DDE) are degradation products of the chlorinated pesticide DDT. Therefore, total DDT represents the sum of concentrations (detection limits used for undetected analytes) reported for DDT and its degradation products DDD and DDE. Total DDT has been measured at similar concentrations during previous monitoring efforts and was

reported in the dredged material at higher concentrations than those observed in this survey (Table 6-1 and Figure 6-5). Dieldrin was not detected during the 2002 monitoring survey but was compared to results from previous monitoring investigations and dredged material disposed of at SF-DODS due to elevated concentrations observed in the dredged material data results. As indicated in Figure 6-5, the detection limits for dieldrin in the 2002 survey were well below the concentration ranges reported for the dredged material characterizations. Alpha-BHC was not graphed due to the lack of available historical data. Alpha-BHC was not detected in the 2000 monitoring survey, nor was it reported with the results obtained for the dredged material characterizations.

Total PCBs, measured as the sum of Aroclors, were not detected or measured as estimates during the 2002 monitoring survey. The range of summed detection limits and estimates were compared to results from previous monitoring investigations and dredged material disposed of at SF-DODS. As indicated in Figure 6-1, the detection limits for total PCBs in the September 2002 survey were well below the concentration ranges reported for the monitoring events and dredged material characterizations.

PAHs, in particular the LPAH phenathrene and the HPAHs fluoranthene, pyrene, chrysene, benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene were detected at multiple locations during this survey (Table 6-1). Station 13, located in the center of the disposal perimeter had the highest concentrations of all PAHs detected during this survey. The total LPAH and total HPAH concentrations (respective sums of their individual analytes) measured during the 2002 survey were similar to concentrations measured during the baseline investigations, but were markedly lower than the reported concentrations for the other monitoring events and dredged material characterizations (Figure 6-5). This may be due to the higher number of stations sampled outside of the dredged material footprint.

Since chemical concentrations of material placed at the SF-DODS site (from Oakland Harbor and Richmond Harbor) were deemed suitable for unconfined aquatic disposal based on biological testing results (USACE, 1996; 1998), it is expected that the levels of these contaminants (e.g., mercury and PAHs) detected at the site would not adversely affect the biological community. None of the contaminants detected during the 2002 survey exceeded the maximum concentrations of the dredged material from Richmond or Oakland harbors.

Table 6-1. Summary comparison of surface sediment conventionals and chemistry for SF-DODS Surveys and Richmond Harbor and Oakland Harbor dredged material characterizations.

	SF-DODS 2002 (Current Study) [1]			SF-DODS 1990-1991 (Baseline Data) [1,2]		SF-DODS 1996-2000 (Monitoring Data) [1,3]		Richmond Inner Harbor 1995-2002 [4]		Oakland Inner Harbor 1994-2001 [4]		Oakland Outer Harbor 1994-1999 [4]	
Dataset	**Min**	**Max**	**Mean**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Conventionals (Dry weight)													
Total Solids (%)	28.0	55.4	38.7	24.6	31.5	29.1	57.3	34.9	45.3	35	55	32	57
Total Organic Carbon (%)	0.9	3.1	2.3	3.2	3.9	0.87	3.2	1.11	1.6	0.43	1.5	0.77	1.7
Fines (silt + clay)	39.5	96.6	79.3	77.0	96.0	40.0	97.0	66.3	98.8	47.3	95.8	52.3	96.5
Metals (mg/kg dw)													
Arsenic	2.40	5.70	3.31	4.40	6.62	1.40	9.90	8.20	14.70	6.2	12.5	4.3	13
Cadmium	0.12	0.53	0.28	0.28	0.38	0.10	0.82	0.20	0.64	0.1	1.1	0.19	0.75
Chromium	31.60	58.10	47.13	100.00	167.00	48.90	120.00	76.20	150.00	54	130	38	180
Copper	17.80	52.10	34.92	41.00	62.00	7.30	62.00	39.00	69.00	23	214	26	79
Lead	5.43	21.30	8.92	5.25	12.00	5.16	44.00	20.00	55.60	14	132	14	65
Mercury	0.07	0.16	0.11	0.13	0.21	0.02	0.31	0.11	0.76	0.14	6.05	0.04	0.59
Nickel	37.80	70.40	58.43	77.00	115.00	45.40	97.00	71.00	100.00	47	110	0.89	140
Selenium	0.30	4.00	2.81	2.80	9.37	0.23	4.40	0.23	2.00	0.16	0.8	0.18	1.8
Silver	0.22	0.78	0.49	0.45	0.87	0.04	2.40	0.19	0.59	0.16	14	0.19	0.84
Zinc	42.10	135.00	83.00	99.00	147.00	48.60	140.00	83.00	163.00	67	566	57	170
Pesticides/PCBs (ug/kg)													
Dieldrin	0.6	3.4	1.1	-	-	2	2.4	2.2	43	3	15	0	0
Total DDT	2.5	11.5	5.5	-	-	1.4	10	0	280	0	18.5	0	39.2
Total PCBs (sum of Aroclors)	11.2	39.4	18.4	-	-	23	120	0	150	0	61	0	149
SVOCs (ug/kg)													
Total LPAH	18.4	57.5	28.5	92	92	28	163	0	261	0	489	30	1573
Total HPAH	46.3	373.6	119.8	220	220	34	1436	0	2510	741	5034	370	10831

Notes:

1. Data results from surface sediments (0-10cm) collected by box corer;
2. (SAIC 1991, 1992a)
3. (SAIC 1996, 1999a, 1999b; Tetra Tech 1999, 2000, 2001)
4. Data results represent sediment cores composited over several feet collected using a vibracorer; data provided by USACE San Francisco District.

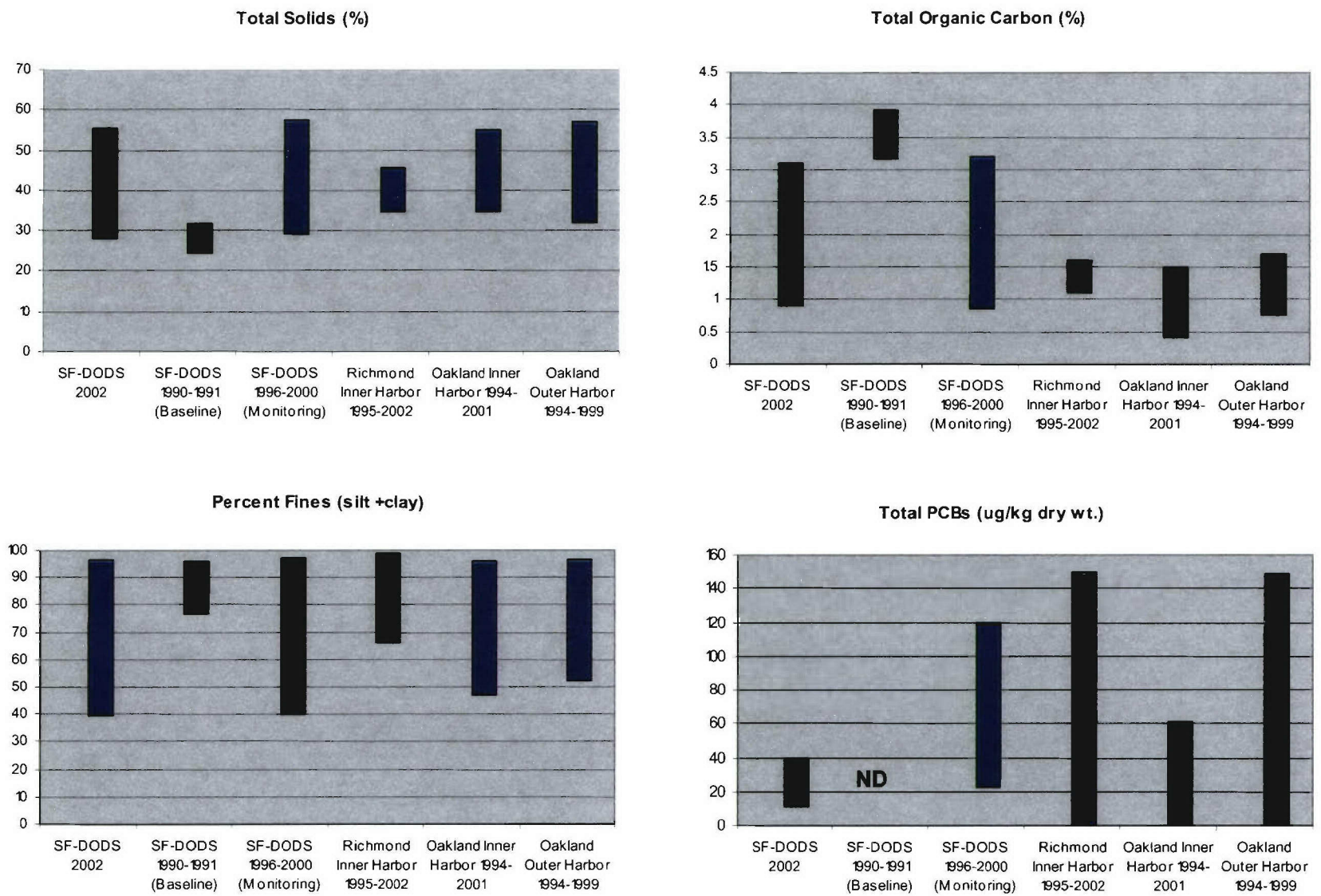


Figure 6-1. Range of conventional and Total PCB concentrations measured at SF-DODS and dredged material from Richmond and Oakland harbors. ND: Not Detected.

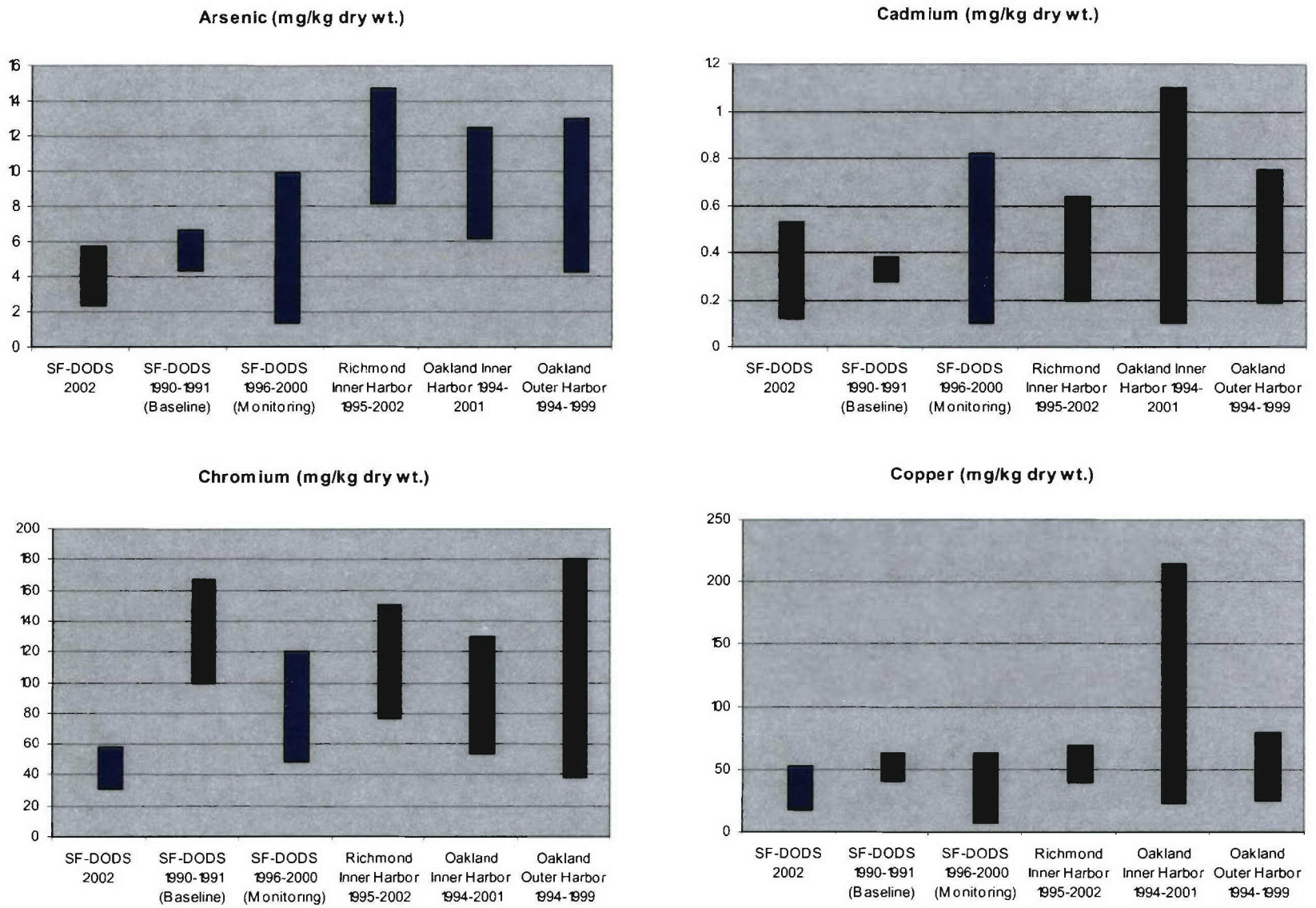


Figure 6-2. Range of concentrations for selected metals measured at SF-DODS and dredged material from Richmond and Oakland harbor.

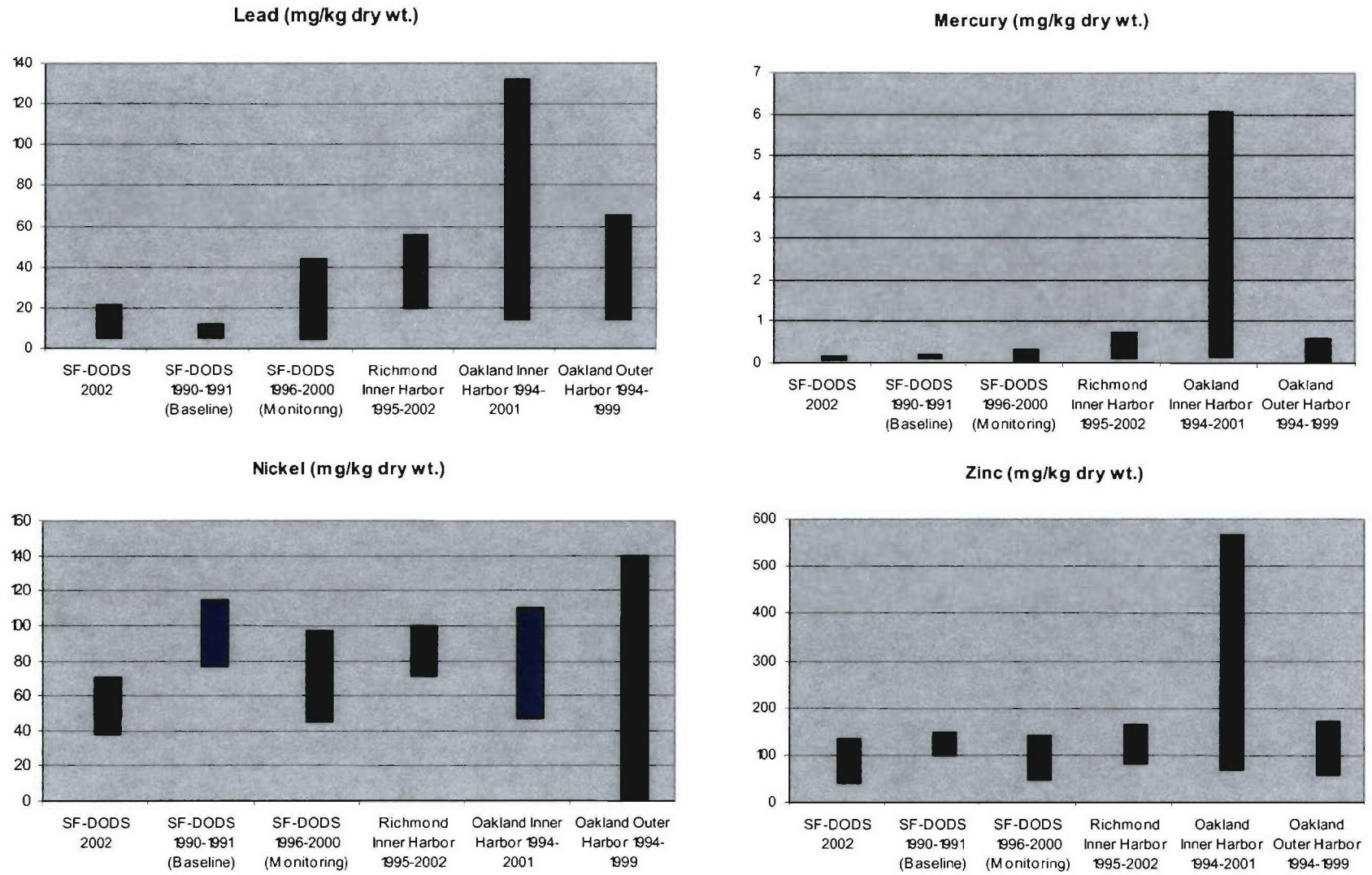


Figure 6-3. Range of concentrations for selected metals measured at SF-DODS and dredged material from Richmond and Oakland harbors.

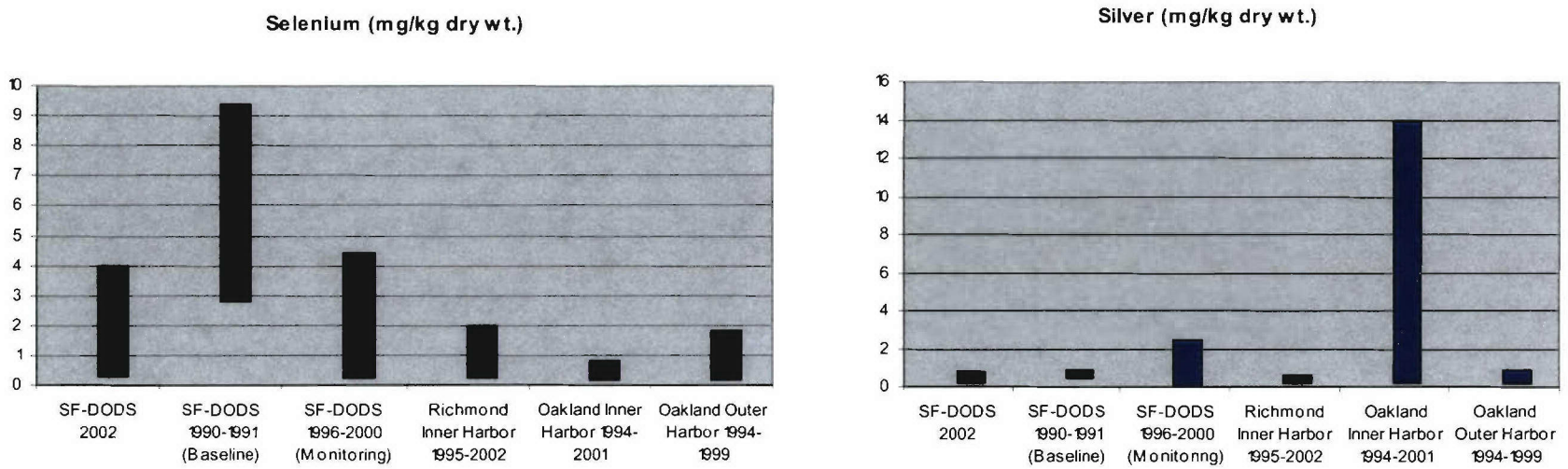


Figure 6-4. Range of concentrations for selected metals measured at SF-DODS and dredged material from Richmond and Oakland harbors.

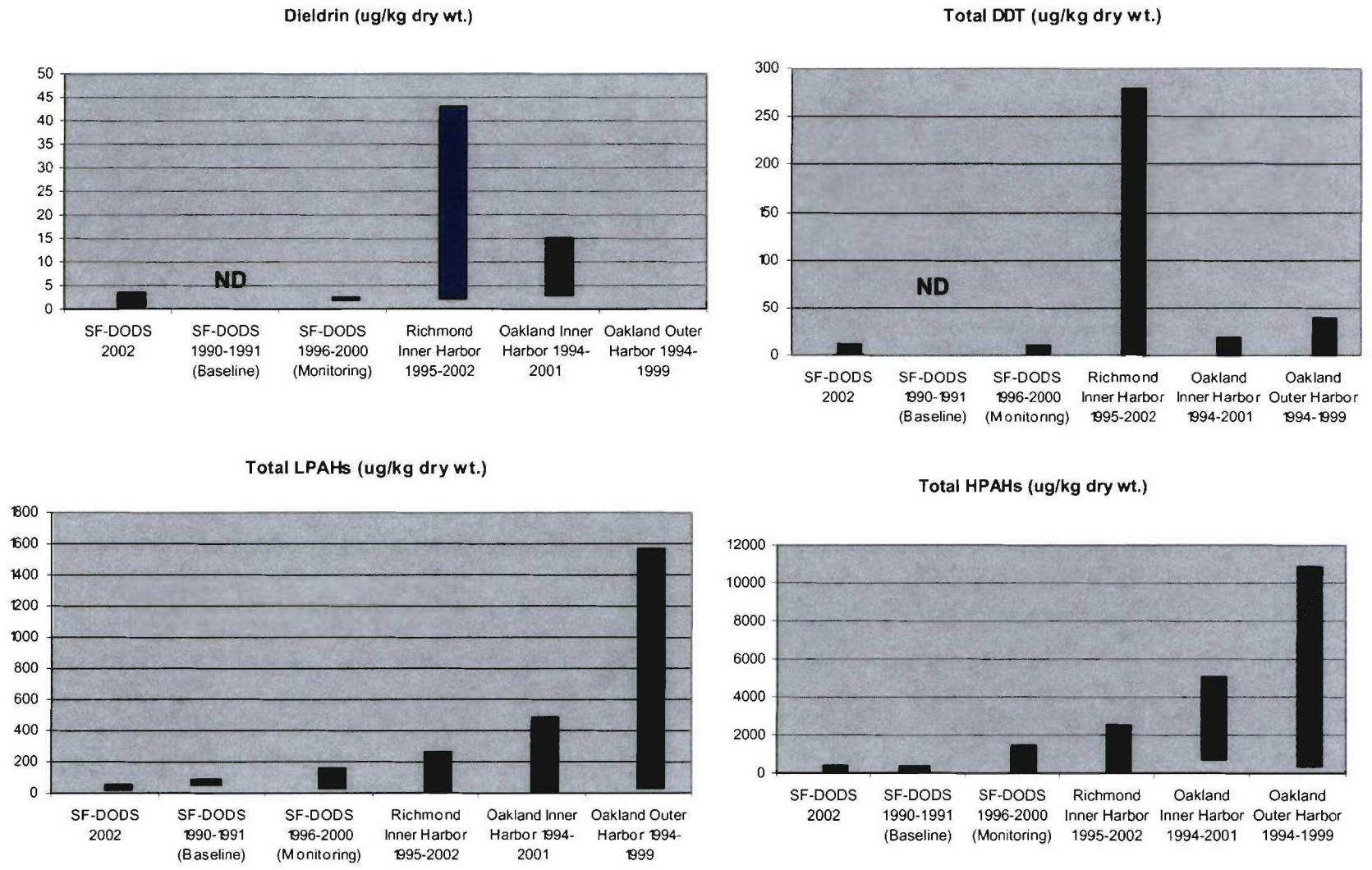


Figure 6-5. Range of concentrations for selected pesticides and PAHs measured at SF-DODS and dredged material from Richmond and Oakland harbors. ND: Not Detected.

6.3 Benthic Infaunal Analysis

6.3.1 Composition of the Fauna

The fauna identified from 15 samples collected in September 2002 included a total of 405 species of benthic invertebrates representing eight phyla. This compares with a total of 458 species from 28 samples collected from the same general area as part of the pre-disposal baseline surveys of 1990 and 1991 (Blake et al., 1992). Of the 405 species, approximately 50 of these were ones not encountered in 1990 and 1991, suggesting that continued sampling will yield additional species.

The relative contribution of the major taxa in the September 2002 samples is similar to that of 1990-1992. For example, in 2002, polychaetes (47.7%), crustaceans (31.6%), molluscs (11.6%), and echinoderms (4.2%) were the predominant taxa. In the 1990-1991 samples, the same groups were predominant: polychaetes (47.4%), crustaceans (32.1%), molluscs (8.5%), and echinoderms (4.4%).

The slope off northern California contains a benthic infauna that is largely undescribed in the scientific literature. We estimate that 273 or 67.4% of the 405 identified species of invertebrates are new to science. This is similar to estimates made as part of the 1990-1991 baseline program (Blake et al., 1992) and is typical of deep-sea habitats.

6.3.2 Indicator Species

When the 15 stations are sorted according to depth, a general faunal shift in dominant taxa from the deepest stations to the shallower ones was detected. Stations deeper than 2850 m were dominated by very thin-bodied polychaetes, whereas more robust worms were prevalent in the 2400-2700 m depth range. The deeper stations (2850-3136 m) are characterized as having *Prionospio delta, Levinsenia flava* and *Cossura* spp. as dominant indicator species. All of these worms have bodies that are long and thin. Stations from about 2450 to 2775 m include the more robust *Aricidea simplex* and *Chaetozone* sp. 1, and sometimes *Spiophanes kroyeri* as dominant indicator species. These shifts among the dominants with depth accompany more important shifts in the larger faunal lists and account for zonation patterns observed in the pattern analyses.

6.3.3 Infaunal Density

In the 1990-1991 baseline studies, Blake et al. (1992) reported that infaunal densities of lower slope depths off northern California were considerably higher than predicted in a review by Jumars and Gallagher (1982). These same trends are evident in the new data from September 2002.

Average densities extrapolated to number of individuals per m^2 (ind/m^2) range from 11,790 (Sta. 50) to 2,720 (Sta. 13). These two stations, however, are outliers in that Station 50 is the shallowest (at 2160 m) and Station 13 is in the center of the disposal site. Nevertheless, the average density of all 15 stations is 6,234 ind/m^2 (SD = 2,300). When these two outliers are removed, the average density is 5,267 ind/m^2. These stations are roughly within the 2500-3200 m depth range and these results are comparable to those from similar depths in 1990 (7,863 ind/m^2) and 1991 (4,806 ind/m^2). In contrast, comparable densities from the U.S. Atlantic slope in similar depths are only 734-1,309 ind/m^2 (Blake and Grassle, 1994). The higher densities in the sediments of the California slope may be attributable to higher surface productivity due to the upwelling zone and commensurate phytoplankton deposits on the seabed. It should be noted that Station 13, although in the center of the disposal site and obviously impacted, still has a higher faunal density (2,720 ind/m^2) than most comparable Atlantic slope ambient sediments (Blake and Grassle, 1994).

6.3.4 Species Richness

The number of species occurring in each sample ranged from a low of 57 at Station 13 to a high of 153 at Station 50. As in the density data, these stations are outliers, with Station 13 located in the center of the disposal site and Station 50 being the shallowest. Nevertheless, the average number of species per station is 102 (SD = 21.21). In 10 stations sampled in 1990 from the same general area and depth range, the average number of species per station was 105.9 (range = 77-121; SD = 16.9). At 16 stations sampled in 1991, the average number of species per sample was 81.3 (range = 43-146; SD = 28.06). The presence of stations in the 1991 samples with reduced species richness is probably related to some of them being located in an adjacent canyon area where some sediments were coarse. The 1990 samples are very similar to those from September 2002.

6.3.5 Species Diversity and Evenness

As is typical for the deep sea, species diversity of the SF-DODS study site is higher than found in shallow-water environments. This pattern results from a high number of species, where no one species or group of species achieves overwhelming numerical dominance, coupled with relatively low densities. The only exception to this pattern at SF-DODS is that at Station 114, the paraonid polychaete *Aricidea simplex* included 27% of the fauna identified. Shannon index values ranged from a low of 4.82 (Station 13) to a high of 6.19 (Station 50). Evenness was relatively consistent, ranging from a low of 0.75 (Station 114) to a high of 0.87 (4 stations).

With respect to stations bordering the disposal site, Stations 17, 19, and 23 all had high species diversity and richness values. For example, Station 17, located on the SE boundary of the disposal site had the second highest Shannon diversity (5.98), one of the highest evenness values (0.87) as well as 117 species present, and a density of 7,110 ind/m^2. As might be expected, Station 13, located in the center of the disposal site, had the lowest Shannon index value (4.82), the lowest number of species (57), and the lowest density (2,720 ind/m^2).

Species diversity as measured by rarefaction gives a better visualization between the stations. By this method, we clearly see that Station 13 has the lowest diversity. In addition, we see that Station 57 slightly exceeds Station 50 as the most diverse site sampled. We also see that the disposal site boundary stations 17, 19, and 23 fall in the upper range of diversities among those sampled.

These composite diversity and richness measurements clearly demonstrate that while the center of the disposal site is clearly reduced in species richness and diversity, stations on the boundaries do not differ from stations at varying distances and directions from the disposal site.

6.3.6 Log-Series Analysis

As noted earlier, May (1975) demonstrated that the Sanders-Hurlbert rarefaction curves produced from deep-sea samples often approach a predicted log-series distribution. This is possible because deep-sea benthic communities do not normally include assemblages where a few species dominate unlike what occurs in shallow water environments. It is very typical to find samples with a long list of species, many of which are represented by only one or two specimens. We can therefore predict that most deep-sea samples will

have very high diversity values when measured with rarefaction and indeed that is the case for 14 of the 15 samples analyzed in this study; Station 13 in the center of the disposal site is the exception. Using Fisher's log-series alpha, we have calculated the predicted log-series distribution and then compared this with the actual rarefaction curve to produce the NDD plots shown earlier in Figure 5-15. In order to test our null hypothesis that there is no departure of NDD in the vicinity of the SF-DODS disposal site boundaries, there should be no one station that exceeds an NDD value of -0.75 and indeed this is the case. This result suggests that no one station exhibits a severe disturbance with respect to species diversity or evenness. Station 13 has the lowest diversity value of any station, but does not register as disturbed by this analysis. Many of the species present occur only once or twice and, although species are few in number, there are 57 present and these are evenly distributed. It appears that the community at Station 13 is in an incipient phase of recolonization. However, unlike similar situations at shallow-water disposal sites, there are no dense assemblages of opportunistic species. Interestingly, the station that exhibits the closest approximation to a log-series expectation is Station 17 on the southeast border of the disposal site. This result suggests that indirect impacts of dredged material disposal had little effect on species diversity at this site.

6.3.7 Community Assemblage Patterns

As part of the baseline surveys of 1990 and 1991, the benthic fauna was found to be zoned by depth. That is, benthic communities along depth gradients were found to be more similar to one another than to communities at deeper or shallower depths (Blake et al., 1992). Within these zones, certain indicator species were found to be the dominants.

In order to examine patterns in benthic assemblages and to test whether the same patterns discovered in the baseline surveys were still present, both cluster analysis, using CNESS and Bray-Curtis, and ordination, using PCA-H, were used. These techniques indicate which stations are similar to one another and which species are responsible for structuring the assemblages.

The results clearly indicate similarity by depth, even of those stations on the boundaries and within the disposal site. Station 13, which lies in the center of the disposal site, joins at a low level of similarity with eight other stations occurring in similar depths. This suggests that even though Station 13 is in the center of the disposal site and subject to the greatest impact of disposal, the colonizing animals are more or less the same ones that would occur if the disposal was not occurring. This result also suggests that if disposal were terminated, the benthic communities would readily return to a pre-disposal assemblage.

6.3.8 Relation of Sediment Texture and Organic Carbon to Benthic Infauna

There is no apparent influence of either sediment texture or organic carbon content on the benthic communities as studied here. Organic carbon concentrations are considerably lower than those recorded during the baseline surveys of 1990-1991 (Blake et al., 1992). The sediments at 14 of the 15 stations sampled were characterized by fine-grained sediments (silt + clay).

Station 17, located on the southeast boundary of the disposal site, was the only location where the sediment was mostly sandier, coarse-grained sediments (61.2%). Based on field observations, this sediment was gritty and undoubtedly contained dredged material. An inspection of three sediment profile images from Station 17 clearly shows a layer of subsurface dredged material overlain by 1-2 cm of finer-grained, recently deposited sediment and underlain by fine-grained compacted sediments. Well-developed feeding voids are evident. All of this biological activity suggests that the infauna is able to accommodate shallow deposits of dredged material. The only unusual aspect of this station is that the small cirratulid polychaete *Chaetozone* sp. 1 was the highest ranked species. This is the only station where *Chaetozone* sp. 1 was so abundant. It is possible that this species responds positively to the presence of coarser-grained sediments and as such might be an early colonizer.

6.3.9 Impact of Dredged Material Disposal on Benthic Communities

The most obvious direct impact of the disposal site is that Station 13, located in the center, has the fewest species, lowest density, and lowest diversity of any of the 15 stations sampled. However, Stations 17, 19, and 23 located on the boundary of the site do not exhibit any apparent impact from dredged material disposal. Each of these stations exhibits high species richness and diversity. In addition, all stations, including Station 13, are composed of species typical for their depth, according to baseline studies conducted in 1990 and 1991 (SAIC, 1991; Blake et al., 1992). Thus, even Station 13 in the center of the disposal site is being colonized by the same species that normally occur in the same depth.

The response of deep-sea benthos to disturbance or burial following dredged material disposal is poorly known. Jumars (1977) reported on a small site at 1200 m in the San Diego Trough that was accidentally buried under 2 to 10 cm of ambient sediment due to a submersible malfunction. The following day, cores were recovered from this buried site. Jumars found that the organisms were beginning to migrate to the top of the core (0-1 cm), but that the deeper the burial, the fewer individuals that survived. He noted that several

individuals had begun to decay and that others might have already been dead or moribund at the time of sampling. The polychaete *Prionospio* sp. was noted to be an important casualty in this experiment. This result suggested to Jumars (1977) that surface deposit feeders would be most affected by burial.

An inspection of the faunal list from Station 13 does not support this suggestion, because the dominant species is *Prionospio delta*, a surface deposit feeder. However, the list of most abundant species at Station 13 does include a long list of subsurface deposit feeders. Interestingly, the large holothurian *Ypsilothuria bententaculata* was clearly visible on the surface of the cores during sample processing.

At this point, it is not clear how long Station 13 had been receiving dredged material or how much material had deposited there because no sediment profile images were taken in September 2002. The sediment did appear to be gray, soft mud such as would occur in a shallow embayment and not the deep sea. Grain size results were 63.2% silt + clay. During the field program in September 2002, two barges per day were observed dumping at the SF-DODS. On-board observers from the U.S. EPA and the USACE confirmed this schedule.

It is most likely that the organisms observed in this sample were there following colonization during the previous year, but also were responding to burial by on-going disposal. The mechanisms of colonization in the deep sea are poorly understood because there is little information on the manner in which deep-sea organisms reproduce, disperse their larvae or juveniles, and migrate from one area to another. However, it is likely that larger organisms such as the large, surface dwelling holothurian *Ypsilothuria bitentaculata* has simply moved to Station 13 from adjacent areas. The smaller, threadlike worms more than likely moved into the site as larvae or postlarvae and settled as primary colonizers.

Colonization of deep-sea benthic communities has been investigated experimentally (Grassle and Morse-Porteous, 1987). These studies included the use of submersibles to deploy boxes containing azoic mud that was left on the bottom for varying lengths of time to document rates of recruitment. Grassle and Morse-Porteous (1987) found that the rates of colonization were slow compared to shallow-water environments. Even after five years, the experimental arrays did not achieve faunal densities and diversities comparable to the surrounding ambient seabed. Highest densities were achieved when the trays were organically enriched. Later, Snelgrove (1991) determined that experimental trays enriched with seaweed and seagrass had unexpectedly high rates of colonization. Thus, the normally slow rates of colonization may be accelerated if an enriched food source is made available.

The only published observations on dredged material disposal in a slope environment were by Pequegnat (1983) from the Gulf of Mexico, who reported that the main effect was a reduction in species diversity, numbers of specimens, and biomass. Within a relatively short time, species diversity and numbers had recovered to pre-disposal levels, but biomass remained low. Pequegnat (1983) further suggested that colonization may be rapid even after a major disposal event. This contrasts with the observations of Grassle and Morse-Porteous (1987) where experimental trays were slow to colonize (see above).

Grassle and Morse-Porteous's experiments on recolonization of deep-sea benthos following disturbance were mostly developed in the North Atlantic, where bottom conditions appear to be more oligotrophic than in the SF-DODS area where surface upwelling produces higher productivity that impinges on the seafloor. Assuming that Station 13 had received dredged material during the 12 months preceding sample collection, it would appear that rather than being slow, the rates of recolonization of these disturbed sediments are very rapid because 272 specimens were found and 57 species of benthic inverterbrates were identified. These observations may lend support to the view of Pequegnat (1983) that recovery of deep-sea sediments is rapid following a large-scale disturbance on the seabed. Further analysis of the archived samples from earlier surveys at SF-DODS will address this issue.

7.0 CONCLUSIONS

Physical, chemical, and benthic community monitoring conducted at the SF-DODS in September 2002 fulfilled the Tier 1 monitoring objectives identified in the SMMP. The SPI survey was conducted to help delimit the extent of the dredged material footprint; sediment chemistry samples were collected from within the dredged material footprint and outside the disposal boundaries and analyzed for the "Green Book" chemicals of concern; and benthic infauna samples were collected and analyzed to assess the impact of dredged material disposal on the benthic community. Based on the results of the September 2002 monitoring program, the following conclusions can be made within the context of the Tier 1 monitoring objectives:

7.1 Physical Monitoring

The 5-centimeter thickness threshold of the dredged material footprint outside of the SF-DODS boundary was not exceeded in 2002.

1. The dredged material footprint at the SF-DODS is oriented to the northwest and southeast and centered over the disposal site. Stations 50, 64, 67, 69, 106, 130, and 135 were sampled for the first time in September 2002 to refine the perimeter of the dredged material footprint. No dredged material was seen at these new stations, with the exception of Station 130. The overall distribution of dredged material at the SF-DODS is similar to 2001.
2. Physical boundary roughness (surface mud clasts, stranded or broken polychaete tubes) was observed in 56 of 96 replicate SPI images (56%).
3. Dredged material observed along the flanks of the deposit is bioturbated, showing evidence of downward mixing. Stage III benthic communities were observed at most SF-DODS stations.
4. Subsurface blue-gray clay observed at SPI stations on the slopes above the central gully may be related to outcrops of natural sedimentary deposits. Radioisotope dating and x-radiograph examination could provide clues to the origins of the blue-gray clay.
5. Due to biological mixing and evidence of physical disturbance, some uncertainty exists as to the interpretation of dredged material thickness measurements and how recent deposition has occurred. However, of all SPI stations sampled in 2002, only Station 19, located at the perimeter of the SF-DODS, showed apparent evidence of recent dredged material deposition. In conformance with current Tier 1

management parameters, deposition of recently placed dredged material did not exceed 5 cm outside the SF-DODS perimeter.

7.2 Chemical Monitoring

None of the contaminants detected during the 2002 survey exceeded the maximum concentrations of the dredged material from Richmond or Oakland harbors that was approved for unconfined aquatic disposal at SF-DODS.

1. Sediment conventional parameters, particularly percent fines, total solids, and TOC at SF-DODS have been modified as compared to baseline results by the deposition of dredged material.
2. Cadmium and lead were the only metals measured at concentrations above the baseline results but, as with all the metals analyzed, the concentrations were similar to or less than concentrations reported for previous monitoring surveys and dredged material characterizations. Metals do not appear to be a contaminant of concern at any of the locations sampled during the 2002 monitoring survey.
3. PCBs were not detected at any locations during the 2002 monitoring survey. Detection limits for PCBs were well below concentrations previously reported in monitoring surveys and dredged material characterizations.
4. The pesticides DDE and alpha-BHC were detected at several locations. Total DDT (the sum of DDT, DDD, and DDE) was similar to concentrations reported previously at the site, but lower than concentrations reported for sediments at the dredging sites. No historical information for alpha-BHC was available for comparison.
5. The highest PAH concentrations detected during the 2002 survey at Station 13 were higher than baseline but lower than other monitoring events and dredged material characterizations.

7.3 Biological Monitoring

No adverse impacts to benthic communities outside of the SF-DODS boundaries were detected.

1. The benthic fauna is rich and diverse throughout the SF-DODS area; the lowest diversity was recorded in the center of the disposal site.
2. The major groups of organisms such as polychaetes, molluscs, and crustaceans are present in the same relative proportions as in the baseline studies of 1990-1991.

3. There is a general trend at stations deeper than 2850 m to be dominated by polychaetes having thin, slender bodies (*Prionospio delta*, *Levinsenia flava*, and *Cossura* spp.); stations from 2420 to 2775 m appear to be dominated by larger, more robust polychaetes such as *Aricidea simplex, Chaetozone* sp. 1, and *Spiophanes kroyeri*. The bivalve *Mendicula ferruginosa* is the dominate species at the shallowest station (50).
4. The dominant species found throughout the study area are the same ones that were dominants in the baseline studies of 1990-1991.
5. The zonation of benthic fauna across depth contours is similar to that recorded during the baseline studies of 1990-1991.
6. Densities of infauna are generally high throughout the study area. Densities are lowest in the center of the disposal site.
7. Stations on the boundary of the disposal site have well-developed and rich benthic communities, similar to those located in areas where there is no evidence of dredged material.
8. The fauna inhabiting disturbed sites within the disposal site boundaries are those species that would normally occur there; exotic, pioneering, or opportunistic species such as occur in disturbed shallow-water benthic communities are absent.
9. Given that 57 species were found in the one sample from the center of the disposal site and that diversity indices suggested that the evenness was high, it is postulated that colonization of such a disturbed site is rapid and that if dredged material disposal were terminated, the community would return to a pre-disposal assemblage.

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APPENDIX A

Station Locations and SPI Data Summary

A-1. REMOTS® Sediment-Profile Imaging
A-2. September 2002 SPI Coordinates
A-3. Box Core Location Data and Sediment Descriptions

Table A-1. REMOTS® Sediment-Profile Imaging data from the SF-DODS, September 2002 survey.

Station	Replicate	Date	Time	Successional	Grain Size (phi) Max			Benthic	Mud Clasts		Camera Penetration (cm)				Dredged Material Thickness (cm)		Apparent RPD Thickness (cm)			OSI	Surface
				Stage	Min	Max	Maj Mode	Habitat	Count	Avg. Diam	Min	Max	Range	Mean	Mean	Grain Size (phi)	Min	Max	Mean		Roughness
10	A	09/23/2002	14:58	ST I on III	> 4 phi	2 phi	4 to 3 phi	UN.SS	4	0.3	17.34	18.54	1.2	17.94	0	0	0.07	8.19	4.63	11	Physical
10	B	09/23/2002	14:59	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SS	0	0	14.09	14.88	0.79	14.49	0	0	0.15	4.59	3.14	10	Biogenic
10	C	09/23/2002	15:01	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	15.95	16.71	0.76	16.33	0	0	1.23	5.73	4.57	7	Biogenic
106	B	09/22/2002	18:41	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	3	0.33	16.86	17.56	0.7	17.21	0	0	4.63	8.10	6.74	7	Biogenic
106	D	09/22/2002	18:45	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	2	0.68	16.95	18.09	1.14	17.52	0	0	3.76	5.99	4.78	11	Biogenic
106	E	09/22/2002	18:46	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	4	0.41	16.48	18.2	1.72	17.34	0	0	1.44	7.66	5.02	11	Biogenic
108	A	09/22/2002	15:30	ST I on III	> 4 phi	4 phi	> 4 phi	UN.SF	0	0	19.29	19.93	0.64	19.61	0	0	-99.00	-99.00	-99.00	99	Indeterminate
108	B	09/22/2002	15:32	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	19.27	20.66	1.39	19.97	Trace	3 phi	-99.00	-99.00	-99.00	99	Indeterminate
108	C	09/22/2002	15:33	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	9	1.88	16.34	17.43	1.09	16.89	2.92	3 phi	1.69	5.63	3.82	7	Physical
109	A	09/22/2002	14:26	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	6	1.89	18.05	18.89	0.84	18.47	3.93	3 phi	2.65	7.96	6.18	11	Physical
109	B	09/22/2002	14:28	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	3	0.64	16.98	18.14	1.16	17.56	1.00	3 phi	0.43	5.74	3.91	11	Biogenic
109	D	09/22/2002	14:31	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	10	0.5	18.3	18.98	0.68	18.64	3.75	3 phi	0.07	9.81	7.47	7	Physical
110	A	09/22/2002	13:28	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	12	0.44	15.52	15.93	0.41	15.73	2.42	3 phi	2.72	3.94	3.40	10	Physical
110	C	09/22/2002	13:32	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	1	1.59	16.05	16.66	0.61	16.35	4.38	3 phi	0.15	7.80	5.44	11	Physical
110	E	09/22/2002	13:35	ST I	> 4 phi	4 phi	> 4 phi	UN.SF	0	0	17.46	18.38	0.92	17.92	Relic DM?	>4 phi	0.36	6.34	4.53	7	Physical
112	A	09/26/2002	03:38	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	19.55	20.96	1.41	20.25	3.82	3 phi	2.31	4.99	3.97	7	Physical
112	B	09/26/2002	03:40	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	14.52	16.05	1.53	15.28	2.09	3 phi	3.93	5.64	4.51	7	Physical
112	C	09/26/2002	03:42	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	0	0	15.36	16.77	1.41	16.07	2.83	2 phi	1.50	4.99	3.12	10	Biogenic
114	A	09/24/2002	15:51	ST I	> 4 phi	2 phi	> 4 phi	UN.SF	20	0.75	19.16	20.41	1.25	19.78	3.31	2 phi	3.22	8.27	6.59	7	Physical
114	B	09/24/2002	15:53	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	5	0.34	17.8	19.07	1.27	18.43	0	0	5.26	8.01	7.32	7	Physical
114	E	09/24/2002	15:58	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SI	6	0.85	16.77	17.55	0.78	17.16	0	0	2.08	7.87	5.30	11	Biogenic
116	F	09/26/2002	08:10	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	0	0	17.57	18.66	1.09	18.11	Trace	2 phi	2.96	6.64	5.43	11	Biogenic
116	G	09/26/2002	08:12	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	3	1.63	15.38	16.66	1.28	16.02	Relic DM?	>4 phi	1.67	5.94	3.21	6	Physical
116	I	09/26/2002	08:16	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	8	0.31	13.93	15	1.07	14.47	0	0	1.57	5.28	3.54	10	Biogenic
130	E	09/24/2002	14:50	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	5.3	6.09	0.79	5.7	0	0	-99.00	-99.00	-99.00	99	Physical
130	G	09/26/2002	06:43	ST I	> 4 phi	2 phi	4 to 3 phi	UN.SS	0	0	9.55	9.71	0.16	9.63	Trace	2 phi	1.37	4.76	2.59	5	Physical
130	J	09/26/2002	06:48	ST I	> 4 phi	3 phi	> 4 phi	UN.SI	0	0	8.29	9.2	0.91	8.74	Relic DM?	>4 phi	2.17	5.07	3.64	6	Physical
135	A	09/24/2002	13:30	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SI	0	0	16.29	17.32	1.03	16.81	0	0	4.85	5.77	5.20	11	Biogenic
135	B	09/24/2002	13:32	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	15.3	17.57	2.27	16.43	0	0	4.50	5.72	5.27	7	Physical
135	C	09/24/2002	13:34	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	15.82	16.95	1.13	16.39	0	0	4.22	5.22	4.73	11	Biogenic
16	C	09/24/2002	09:50	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	14.07	14.98	0.91	14.52	4.88	2 phi	2.71	4.57	3.78	11	Physical
16	D	09/24/2002	09:51	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	16.34	17.52	1.18	16.93	3.8	2 phi	2.70	6.56	4.82	7	Physical
16	E	09/24/2002	09:53	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	4	0.98	15.45	16.34	0.89	15.9	5.76	2 phi	3.67	7.41	5.12	7	Physical
17	A	09/24/2002	10:36	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	15.12	16.23	1.11	15.67	7.07	2 phi	2.32	4.65	3.30	10	Physical
17	D	09/24/2002	10:41	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	1	0.62	13.75	14.89	1.14	14.32	8.32	2 phi	3.14	6.12	4.52	7	Physical
17	E	09/24/2002	10:43	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	15.59	16.11	0.52	15.85	5.82	2 phi	2.83	6.09	4.96	7	Physical
19	A	09/25/2002	12:12	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	0	0	16.89	17.48	0.59	17.18	3.02	2 phi	0.15	3.85	2.05	8	Physical
19	B	09/25/2002	12:15	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	14	0.5	20.07	20.71	0.64	20.39	2.65	2 phi	2.43	5.37	4.02	11	Physical
19	F	09/25/2002	12:25	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	8	0.26	20.38	20.95	0.57	20.67	2.54	2 phi	0.95	2.99	2.79	9	Biogenic
2	A	09/23/2002	17:08	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	7	0	13.96	15.46	1.5	14.71	3	2 phi	0.51	4.49	3.48	6	Physical
2	B	09/23/2002	17:09	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	4	0.34	15.68	16.25	0.57	15.97	6.16	2 phi	0.15	4.72	3.15	6	Physical
2	C	09/23/2002	17:11	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	13.32	13.68	0.36	13.5	7.46	2 phi	1.47	5.44	3.37	6	Physical
20	A	09/25/2002	09:56	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SI	1	0.67	18.2	18.59	0.39	18.4	3.05	2 phi	0.87	4.44	2.97	9	Physical
20	B	09/25/2002	09:58	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	0	0	19.75	20.09	0.34	19.92	3.19	2 phi	1.75	6.57	5.44	11	Physical
20	C	09/25/2002	10:00	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	1	0.45	18.52	19.21	0.69	18.86	3.08	2 phi	1.39	6.31	4.04	11	Biogenic
21	A	09/27/2002	17:23	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	19.57	20.55	0.98	20.06	0	0	2.68	8.61	6.80	11	Biogenic
21	B	09/27/2002	17:25	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SI	1	1.44	15.93	20.16	4.23	18.05	0	0	3.83	8.46	6.19	11	Biogenic
21	D	09/27/2002	17:30	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	0	0	18.54	19.73	1.19	19.14	0	0	3.34	6.61	5.44	11	Biogenic

Table A-1. REMOTS® Sediment-Profile Imaging data from the SF-DODS, September 2002 survey.

Station	Replicate	Date	Time	Successional	Grain Size (phi) Max			Benthic	Mud Clasts		Camera Penetration (cm)				Dredged Material Thickness (cm)		Apparent RPD Thickness (cm)			OSI	Surface
				Stage	Min	Max	Maj Mode	Habitat	Count	Avg. Diam	Min	Max	Range	Mean	Mean	Grain Size (phi)	Min	Max	Mean		Roughness
27	A	09/23/2002	10:43	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	17.52	18.32	0.8	17.92	4.52	2 phi	0.88	6.57	3.65	10	Biogenic
27	B	09/23/2002	10:45	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	16.32	16.77	0.45	16.55	2.16	2 phi	0.72	5.44	3.17	10	Biogenic
27	C	09/23/2002	10:47	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	18.36	19.5	1.14	18.93	3.73	2 phi	2.57	6.44	4.60	11	Physical
37	A	09/22/2002	16:34	ST I	> 4 phi	2 phi	> 4 phi	UN.SF	15	0.38	15.46	17.07	1.61	16.26	4.36	2 phi	1.87	6.32	3.53	6	Physical
37	C	09/22/2002	16:38	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	5	0	17.18	18.45	1.27	17.82	0	0	1.97	7.88	6.25	11	Biogenic
37	D	09/22/2002	16:39	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	17.09	17.77	0.68	17.43	2.39	3 phi	1.74	4.99	4.31	7	Biogenic
44	G	09/26/2002	09:23	ST I	> 4 phi	2 phi	> 4 phi	UN.SF	4	0.32	14.84	15.57	0.73	15.2	0	0	0.21	4.12	2.14	4	Biogenic
44	H	09/26/2002	09:25	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	1	0.18	16.71	17.43	0.72	17.07	0	0	1.07	3.58	3.23	10	Biogenic
44	J	09/26/2002	09:29	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	3	3.01	17.04	17.93	0.89	17.49	0	0	0.51	5.65	4.54	11	Physical
49	B	09/27/2002	14:23	ST I	> 4 phi	2 phi	> 4 phi	UN.SF	1	0.63	18.77	19.95	1.18	19.36	2.79	2 phi	3.27	5.13	4.50	7	Biogenic
49	C	09/27/2002	14:25	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	8	0.66	20.48	20.96	0.48	20.72	2.84	2 phi	4.29	5.51	4.94	11	Physical
49	D	09/27/2002	14:27	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	7	0	18.12	19.25	1.13	18.69	1.99	2 phi	1.09	6.01	5.11	11	Physical
50	A	09/22/2002	20:41	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	12	0	17.89	19.05	1.16	18.47	0	0	4.62	7.30	6.01	11	Physical
50	B	09/22/2002	20:43	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	10	0.87	19.41	20.43	1.02	19.92	0	0	3.78	4.64	4.23	7	Biogenic
50	C	09/22/2002	20:45	INDET	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	3.89	4.82	0.93	4.36	0	0	-99.00	-99.00	-99.00	99	Biogenic
52	A	09/22/2002	23:16	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	3	0.4	18.46	19.8	1.34	19.13	0	0	3.53	5.48	4.84	11	Biogenic
52	B	09/22/2002	23:18	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	18.14	18.62	0.48	18.38	0	0	3.13	5.74	5.05	7	Biogenic
52	D	09/22/2002	23:21	ST I	> 4 phi	2 phi	> 4 phi	UN.SF	12	1.06	18.82	19.54	0.72	19.18	0	0	1.29	7.75	4.92	7	Physical
57	A	09/23/2002	08:35	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	7	0.35	13.62	15.98	2.36	14.8	2.00	3 phi	1.90	4.38	3.19	10	Physical
57	B	09/23/2002	08:37	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	14.23	14.91	0.68	14.57	3.50	3 phi	2.14	5.27	3.37	10	Physical
57	C	09/23/2002	08:39	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	14.45	17.3	2.85	15.88	3.00	3 phi	2.05	4.61	3.48	6	Physical
6	B	09/24/2002	07:26	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	15.07	16.12	1.05	15.6	3.23	3 phi	1.85	4.98	3.55	10	Physical
6	C	09/24/2002	07:28	ST I	> 4 phi	2 phi	> 4 phi	UN.SI	0	0	15.09	16	0.91	15.55	5.09	2 phi	1.78	5.07	4.34	7	Physical
6	D	09/24/2002	07:30	ST I	> 4 phi	3 phi	> 4 phi	UN.SI	3	0.45	17.84	18.8	0.96	18.32	3.73	3 phi	3.98	7.52	6.55	7	Biogenic
64	F	09/26/2002	11:35	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	1	0.31	18.38	19.41	1.03	18.9	0	0	1.64	3.36	2.28	9	Physical
64	H	09/26/2002	11:38	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SI	0	0	17.62	19.02	1.4	18.32	0	0	2.75	6.37	4.90	11	Biogenic
64	J	09/26/2002	11:42	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	3	0.35	18.52	19.77	1.25	19.15	0	0	2.51	4.37	3.56	10	Physical
67	A	09/26/2002	13:51	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	2	0.33	17.05	17.86	0.81	17.45	0	0	1.28	5.71	3.37	10	Biogenic
67	C	09/26/2002	13:55	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	18.39	19.34	0.95	18.86	0	0	2.48	6.21	4.78	7	Physical
67	E	09/26/2002	13:59	ST I on III	> 4 phi	2 phi	> 4 phi	UN.SF	0	0	20.46	21	0.54	20.73	0	0	1.44	4.53	3.78	11	Biogenic
69	A	09/26/2002	16:09	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	4	4.68	13.59	15.41	1.82	14.5	0	0	1.82	7.50	3.70	10	Physical
69	D	09/26/2002	16:15	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	2	0.34	18.3	19.8	1.5	19.05	0	0	1.18	5.73	4.13	7	Physical
69	E	09/26/2002	16:17	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SI	1	0.35	19.77	20.89	1.12	20.33	0	0	0.22	6.91	3.21	10	Physical
71	A	09/23/2002	12:29	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	16.64	18	1.36	17.32	0	0	4.45	6.13	5.61	11	Physical
71	B	09/23/2002	12:30	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	17.79	18.57	0.78	18.18	0	0	4.51	7.42	6.10	7	Biogenic
71	C	09/23/2002	12:32	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	16.61	17.43	0.82	17.02	0	0	4.14	8.78	7.49	11	Biogenic
74	A	09/23/2002	02:51	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	17	19	2	18	4.65	3 phi	3.61	5.91	5.14	11	Physical
74	B	09/23/2002	02:53	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	15.14	16.75	1.61	15.94	2.29	3 phi	2.30	5.90	4.68	11	Biogenic
74	C	09/23/2002	02:54	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	16.98	18.12	1.14	17.55	3.00	3 phi	3.05	6.46	4.60	7	Biogenic
76	A	09/23/2002	1:02	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	20	0.68	17.71	18.68	0.97	18.19	0	0	2.36	4.79	3.62	6	Physical
76	B	09/23/2002	1:04	ST I	> 4 phi	3 phi	> 4 phi	UN.SF	4	0.28	16.14	16.98	0.84	16.56	0	0	3.57	6.12	4.68	7	Physical
76	C	09/23/2002	1:06	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	3	0.38	15.55	16.91	1.36	16.23	0	0	1.58	4.82	4.05	11	Biogenic
91	A	09/23/2002	04:51	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	15.29	15.96	0.67	15.62	0	0	1.75	4.74	4.16	11	Biogenic
91	B	09/23/2002	04:53	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	16.95	18.25	1.3	17.6	0	0	2.75	5.35	4.37	11	Physical
91	D	09/23/2002	04:56	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	16.27	17.43	1.16	16.85	0	0	3.71	5.60	4.78	11	Biogenic
92	A	09/23/2002	06:04	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	17.43	18.14	0.71	17.78	0	0	2.18	4.71	4.07	11	Physical
92	B	09/23/2002	06:06	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	18.54	19.59	1.05	19.07	0	0	2.24	6.87	5.75	11	Biogenic
92	D	09/23/2002	06:09	ST I on III	> 4 phi	3 phi	> 4 phi	UN.SF	0	0	18.18	18.77	0.59	18.48	0	0	2.93	5.72	4.33	11	Physical

Table A-2. September 2002 SPI Coordinates at SF-DODS.

Station	Date	Rep	Tie	Depth (m)	Latitude (N)	Longitude (W)
SF-DODS 110	09/22/02	A	1328	2080	37 36.988	123 24.987
		B	1330	2080	37 37.000	123 24.987
		C	1332	2080	37 37.006	123 24.984
		D	1334	2080	37 37.007	123 24.971
		E	1335	2080	37 37.013	123 24.969
SF-DODS 109	09/22/02	A	1426	2360	37 38.003	123 24.909
		B	1428	2360	37 38.007	123 24.890
		C	1429	2360	37 38.012	123 24.870
		D	1431	2360	37 38.015	123 24.845
		E	1433	2360	37 38.015	123 24.846
SF-DODS 108	09/22/02	A	1530	2690	37 38.959	123 24.855
		B	1532	2690	37 38.964	123 24.830
		C	1534	2690	37 38.980	123 24.818
		D	1536	2690	37 38.988	123 24.805
		E	1538	2690	37 38.977	123 24.783
SF-DODS 37	09/22/02	A	1634	2880	37 38.882	123 26.024
		B	1636	2880	37 38.895	123 26.025
		C	1638	2880	37 38.904	123 26.025
		D	1639	2880	37 38.912	123 26.022
		E	1641	2880	37 38.919	123 26.014
SF-DODS 106	09/22/02	A	1839	2510	37 40.976	123 25.012
		B	1841	2510	37 40.985	123 25.032
		C	1842	2510	37 40.955	123 25.044
		D	1845	2510	37 41.005	123 25.064
		E	1846	2510	37 41.012	123 25.088
SF-DODS 50	09/22/02	A	2041	2220	37 42.986	123 26.002
		B	2042	2220	37 43.000	123 24.006
		C	2045	2220	37 43.006	123 26.006
		D	2047	2220	37 43.014	123 26.002
		E	2048	2220	37 43.025	123 25.997
SF-DODS 52	09/22/02	A	2316	2342	37 42.988	123 28.023
		B	2318	2342	37 42.994	123 28.040
		C	2319	2342	37 43.005	123 28.054
		D	2321	2342	37 43.001	123 28.077
		E	2323	2342	37 43.000	123 28.105
SF-DODS 76	09/23/02	A	0102	2330	37 43.978	123 30.971
		B	0104	2330	37 43.982	123 30.978
		C	0106	2330	37 43.984	123 30.988
		D	0107	2330	37 43.985	123 30.991
		E	0109	2330	37 43.984	123 30.992
SF-DODS 74	09/23/02	A	0251	2800	37 43.996	123 32.997
		B	0253	2800	37 44.007	123 33.018
		C	0254	2800	37 44.019	123 33.031
		D	0256	2800	37 44.015	123 33.027
		E	0258	2800	37 44.001	123 33.012
SF-DODS 91	09/23/02	A	0451	2980	37 43.962	123 34.930
		B	0453	2980	37 43.954	123 34.942
		C	0455	2980	37 43.949	123 34.956
		D	0456	2980	37 43.946	123 34.966
		E	0558	2980	37 43.946	123 34.980

Table A-2. September 2002 SPI Coordinates at SF-DODS.

Station	Date	Rep	Tie	Depth (m)	Latitude (N)	Longitude (W)
SF-DODS 92	09/23/02	A	0604	2890	37 45.116	123 35.286
		B	0606	2890	37 45.128	123 35.308
		C	0608	2890	37 45.141	123 35.334
		D	0610	2890	37 45.141	123 35.354
		E	0612	2890	37 45.153	123 35.382
SF-DODS 57	09/23/02	A	0835	2700	37 42.984	123 32.979
		B	0837	2700	37 42.996	123 32.998
		C	0838	2700	37 43.006	123 33.018
		D	0840	2700	37 43.016	123 33.031
		E	0842	2700	37 43.020	123 33.043
SF-DODS 27	09/23/02	A	1042	2880	37 40.989	123 31.997
		B	1045	2880	37 40.996	123 32.009
		C	1047	2880	37 41.001	123 32.024
		D	1049	2880	37 41.011	123 32.038
		E	1051	2800	37 41.034	123 32.049
SF-DODS 71	09/23/02	A	1229	2866	37 42.027	123 33.992
		B	1231	2866	37 42.035	123 34.005
		C	1232	2866	37 42.048	123 34.027
		D	1233	2866	37 42.056	123 34.033
		E	1235	2866	37 42.058	123 34.038
SF-DODS 010	09/23/02	A	1458	2805	37 39.951	123 30.983
		B	1500	2805	37 39.931	123 30.988
		C	1501	2805	37 39.907	123 30.988
		D	1502	2805	37 39.887	123 30.988
		E	1504	2805	37 39.803	123 30.986
		F	1506	2805	37 39.833	123 31.001
SF-DODS 02	09/23/02	A	1708	2610	37 40.999	123 30.004
		B	1710	2610	37 40.982	123 29.999
		C	1711	2610	37 40.963	123 30.008
		D	1713	2610	37 40.950	123 30.015
		E	1715	2610	37 40.946	123 30.021
SF-DODS 06	09/24/02	A	0724	2700	37 39.983	123 26.981
		B	0726	2700	37 40.006	123 26.996
		C	0728	2700	37 40.018	123 27.012
		D	0730	2700	37 40.021	123 27.028
		E	0732	2700	37 40.027	123 27.041
SF-DODS 16	09/24/02	A	0940	2705	37 38.012	123 27.001
		B	0948	2705	37 38.052	123 27.059
		C	0949	2705	37 38.068	123 27.072
		D	0951	2705	37 38.083	123 27.086
		E	0953	2705	37 38.089	123 27.100
SF-DODS 17	09/24/02	A	1035	2787	37 38.003	123 27.968
		B	1037	2787	37 38.002	123 27.973
		C	1039	2787	37 38.003	123 27.984
		D	1041	2787	37 38.000	123 27.994
		E	1042	2787	37 37.997	123 28.002
SF-DODS 135	09/24/02	A	1330	2860	37 33.008	123 26.999
		B	1332	2860	37 33.013	123 26.974
		C	1334	2860	37 33.020	123 26.962
		D	1336	2860	37 33.018	123 26.968
		E	1337	2860	37 33.014	123 26.985

Table A-2. September 2002 SPI Coordinates at SF-DODS.

Station	Date	Rep	Tie	Depth (m)	Latitude (N)	Longitude (W)
SF-DODS 130	09/24/02	A	1446	2430	37 34.031	123 26.890
		B	1447	2430	37 34.040	123 26.879
		C	1448	2430	37 34.050	123 26.865
		D	1449	2430	37 34.055	123 26.857
		E	1451	2430	37 34.068	123 26.836
SF-DODS 114	09/24/02	A	1551	2403	37 35.013	123 27.013
		B	1553	2403	37 35.039	123 27.037
		C	1555	2403	37 35.056	123 27.057
		D	1557	2403	37 35.072	123 27.075
		E	1558	2403	37 35.088	123 27.097
SF-DODS 116	09/24/02	A	2048	2950	37 34.958	123 28.957
		B	2050	2950	37 34.984	123 28.971
		C	2052	2950	37 35.007	123 28.984
		D	2057	2950	37 35.035	123 29.068
		E	2059	2950	37 35.034	123 29.098
SF-DODS 44	09/24/02	A	2201	2943	37 35.999	123 29.990
		B	2202	2943	37 36.003	123 30.008
		C	2204	2943	37 36.014	123 30.021
		D	2205	2943	37 36.020	123 30.029
		E	2207	2943	37 36.019	123 30.034
SF-DODS 64	09/25/02	A	0013	3170	37 35.976	123 32.987
		B	0015	3170	37 35.993	123 33.004
		C	0017	3170	37 36.006	123 33.001
		D	0019	3170	37 36.023	123 32.992
		E	0021	3170	37 36.050	123 32.995
SF-DODS 20	09/25/02	A	0730	3093	37 38.025	123 30.931
		B	0733	3093	37 38.040	123 30.947
		C	0736	3093	37 38.052	123 30.962
		D	0738	3093	37 38.064	123 30.974
		E	0740	3042	37 38.078	123 30.984
SF-DODS 19	09/25/02	A	1212	2971	37 37.959	123 29.980
		B	1215	2971	37 37.963	123 29.954
		C	1218	2971	37 37.965	123 29.927
		D	1220	2971	37 37.976	123 29.912
		E	1222	2971	37 37.981	123 29.900
		F	1225	2971	37 38.002	123 29.889

Table A-2. September 2002 SPI Coordinates at SF-DODS.

Station	Date	Rep	Tie	Depth (m)	Latitude (N)	Longitude (W)
SF-DODS 20	09/25/02	F	0956	3032	37 37.987	123 30.988
		G	0958	3032	37 38.006	123 30.998
		H	1000	3032	37 38.022	123 31.007
		I	1001	3032	37 38.032	123 31.020
		J	1003	3032	37 38.045	123 31.040
SF-DODS 112	09/26/02	A	0338	2160	37 34.987	123 25.013
		B	0340	2160	37 34.999	123 25.025
		C	0342	2160	37 35.025	123 25.038
		D	0344	2160	37 35.045	123 25.050
		E	0346	2160	37 35.068	123 25.067
SF-DODS 130	09/26/02	F	0641	2413	37 33.955	123 26.431
		G	0643	2413	37 33.977	123 26.953
		H	0645	2413	37 37.001	123 26.981
		I	0647	2413	37 34.028	123 27.007
		J	0648	2413	37 34.043	123 27.022
SF-DODS 116	09/26/02	F	0809	2717	37 35.003	123 28.902
		G	0812	2717	37 35.015	123 28.922
		H	0814	2717	37 35.037	123 28.957
		I	0816	2717	37 35.064	123 28.991
		J	0817	2717	37 35.077	123 29.011
SF-DODS 44	09/26/02	F	0921	2958	37 36.018	123 29.946
		G	0923	2958	37 36.030	123 29.953
		H	0925	2958	37 36.065	123 29.973
		I	0927	2958	37 36.091	123 29.986
		J	0929	2958	37 36.099	123 29.975
SF-DODS 64	09/26/02	F	1135	3140	37 36.067	123 32.984
		G	1136	3140	37 36.083	123 32.993
		H	1138	3140	37 36.092	123 32.993
		I	1140	3140	37 36.098	123 32.985
		J	1142	3140	37 36.120	123 32.987
SF-DODS 67	09/26/02	A	1351	3170	37 37.998	123 33.998
		B	1353	3170	37 37.987	123 34.006
		C	1355	3170	37 37.996	123 34.001
		D	1357	3170	37 38.027	123 34.027
		E	1359	3170	37 38.043	123 34.004
SF-DODS 69	09/26/02	A	1610	3000	37 39.976	123 33.916
		B	1611	3000	37 40.000	123 33.922
		C	1613	3000	37 40.022	123 33.919
		D	1615	3000	37 40.045	123 33.919
		E	1617	3000	37 40.076	123 33.923
SF-DODS 49	09/27/02	A	1421	3060	37 38.952	123 31.968
		B	1423	3060	37 38.980	123 31.989
		C	1425	3060	37 39.007	123 32.006
		D	1427	3060	37 39.014	123 32.048
		E	1429	3060	37 39.028	123 32.111
SF-DODS 21	09/27/02	A	1723	3040	37 37.074	123 31.166
		B	1725	3040	37 37.091	123 31.242
		C	1727	3040	37 37.103	123 31.297
		D	1730	3040	37 37.122	123 31.360
		E	1732	3040	37 37.135	123 31.391

Table A-3. Box core location data and sediment descriptions for September 2002 SF-DODS survey.

Station	Date	Rep	Time	Depth (m)	Latitude (N)	Longitude (W)	Comments from Sediment Data Sheets
SF-DODS 16	09/21/02	A	2116	2693	37 38.024'	123 26.954'	Thin layer of silty-sand overlying a silty-clay. Olive-green throughout with no detectable odor. Several small tube worms and polychaetes were observed on the sediment surface. Silty-clay is mildly stiff, held shape upon extraction, but easily homogenized.
SF-DODS 17	09/21/02	A	2329	2775	37 38.013'	123 27.944'	Sandy layer present over silty-clay. Sandy surface has silt component and combined thickness is ~1-2mm. Greenish-gray clay/silt, consolidated for most of core depth. Worm tubes present on surface. No detectable odor.
SF-DODS 19	09/22/02	A	0148	3000	37 38.009'	123 30.001'	Olive-greenish gray mud with silt/clay under sandy silt surface layer. Surface sand ~1mm thick. Numerous tube worms, polychaetes and some brittle stars on surface. No detectable odor. No H_2S smell. Relatively consolidated sediment, stands on its own.
SF-DODS 20	09/22/02	B	0625	3050	37 38.060'	123 31.011'	Olive-green and gray silty mud w/fine black sand visible on surface. Clay/silt slightly cohesive - did not retain shape; no detectable odor. Some tube worms and burrows in surface, small anemone in one subcore. Sediment surface relatively flat w/slight slope w/exception of one subcore that appeared to be biogenically disturbed.
SF-DODS 10	09/22/02	A	0843	2739	37 39.999'	123 31.001'	Three subcores (6,7,24) were elevated approx. 10-15cm above the other 22 subcores. Overlying water was clear, slight disturbance around the edges of the subcores. Surface of cores appeared intact with numerous brittle stars and tube worms. Fine grained sand on surface; olive-green gray silt-clay underlying. No detectable odor.
SF-DODS 06	09/22/02	A	1055	2697	37 40.020'	123 26.999'	Olive-green / gray silty sand on surface (1-2mm) very fine. Add'l sand dispersed deeper throughout subcores (3-4cm deep). Numerous tube worms, ploychaetes in sediment up to 10 cm. Darker material below 4 cm in some subcores. Not highly consolidated, stiff but sloughs easily when pressed w/sample spoon.
SF-DODS 27	09/23/02	A	1924	2825	37 40.959'	123 31.938'	Surface relatively even across subcores w/ slight downslope on right-side row of subcores. Overlying water clear and surfaces appear to be undisturbed. Sediment is drab olive-green gray silty-clay. No visible sand. Consistency is softer towards the top layer, stiffer clay towards the bottom of sample. No detectable odor. Tube worms, brittle stars and sea pens were visible in several subcores. No discernable dredged material, but several orange flecks were visible on the surface.

Table A-3. Box core location data and sediment descriptions for September 2002 SF-DODS survey.

Station	Date	Rep	Time	Depth (m)	Latitude (N)	Longitude (W)	Comments from Sediment Data Sheets
SF-DODS 57	09/23/02	B	2310	2709	37 42.971'	123 32.937'	Very highly consolidated sediment. Surface flocculant layer (~1mm) thick is olive-green gray in color and very wet. Sediment beneath, to 10 cm, is dark gray green and consists of clay-silt. Tube worms (~1-2 mm dia.) present throughout. Sediment cores are very stiff with minimal sloughing. Difficult to homogenize. No detectible odor.
SF-DODS 92	09/24/02	B	0131	2850	37 44.996'	123 34.998'	Top flocculant layer (~1cm) was olive-green, very soft, and low density. Below (~9cm) sediment was minimally consolidated, sloughed easily and did not stick to sampler, color was olive-green with some dark gray marbling throughout. Did not appear entirely homogeneous. No evidence of dredged material or sands. No detectable odor.
SF-DODS 50	09/24/02	A	0440	2160	37 42.951'	123 25.896'	Very soft material, relatively low consolidation. Sloughs easily. Olive-green clay-silt. No evidence of dredged material on surface. No detectable odor.
SF-DODS 116	09/25/02	A	2140	2975	37 34.989'	123 28.979'	Drab-olive silty-clay with some tube worms and epibenthic organisms. Sediment is unconsolidated, soft material with no discernable odor. No evidence of dredged material. Overlying water cloudy; and partially disturbed but deemed acceptable.
SF-DODS 64	09/25/02	A	2353	3136	37 36.005'	123 33.005'	~1-2 mm thick layer of flocculated silt on surface. Olive-green. Several tube worms (2-4 mm, dia.) emerging 2-4cm from surface. Darker green-gray sediment underneath. Somewhat stiff, but sloughs when prodded, pudding like consistency. No observable dredged material or sandy materials. Relatively fine silts/clays present. No detectable odor. Relatively high water content.
SF-DODS 23	09/26/02	A	2037	2954	37 36.953'	123 29.018'	Gray/olive-green unconsolidated silt and clay with no visible sand. Surface even with mounds of sediment, some tube worms visible. No discernable odor. Lower horizon (5-10cm) slightly stiffer clay that retained shape, but readily pliable when pressed.
SF-DODS 114	09/27/02	D	0410	2420	37 35.084'	123 26.964'	Olive-green silty-clay (~0.5-1 cm thick) on suface of subcores. Dark green gray clay silt on bottom. Surface is very flocculated and washes easily with water. Subsurface is highly consolidated clay and stands on its own. Some tube worms and polychaetes visible on surface. No evidence of dredged material or sandy deposits. No detectable odor.
SF-DODS 13	09/27/02	A	0623	2902	37 38.917'	123 28.953'	Gray uneven surface, sand, silt, clay and shell debris. No odor. Soft unconsolidated material with clay clasts/nodules on surface. Soft malleable clay in lower horizon. Very small amounts of organic detritus, small gravel in sediment.

APPENDIX B

Quality Assurance Report and 2002 Sediment Chemistry Data

Columbia Analytical Services INC.
An Employee-Owned Company

November 15, 2002 Service Request No: K2206977

Ted Turk
SAIC
18706 North Creek Parkway
Suite 110
Bothell, WA 98011

RE: SF-DODS Sea Floor Monitoring/SF-DODS

Dear Ted:

Enclosed are the results of the sample(s) submitted to our laboratory on October 1, 2002. For your reference, these analyses have been assigned our service request number K2206977.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Harvey Jacky
Project Chemist

HJ/afs

NELAC Accredited
1317 South 13th Avenue PO Box 479 Kelso Washington 98626
(360) 577-7222 (800) 695-7222x07 Fax (360) 636-1068
ACIL Seal of Excellence Laboratory

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Science Applications International Corporation	**Service Request No.:**	K2206977
Project:	SF-DODS Sea Floor Monitoring	**Date Received:**	10/1/02
Sample Matrix:	Sediment / Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

One water sample and sixteen sediment samples were received for analysis at Columbia Analytical Services on 10/1/02. The following discrepancies were noted upon initial sample inspection. A 16-ounce sample jar for sample SF-DODS-050 was received with a broken bottom. Approximately 90% of the sample was saved and transferred to another container. The exceptions are also noted on the cooler receipt and preservation form included in this data package. Except as noted, the samples were received in good condition and consistent with the accompanying chain of custody form. The sample containers assigned to analyses were stored in a refrigerator at 4 °C; additional sample volume was also frozen at –20°C upon receipt at the laboratory.

General Chemistry Parameters

Total Sulfide by EPA Method 9030M
The Relative Percent Difference (RPD) criterion for the replicate analysis of sulfide in sample SF-DODS-013 Dup is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Oil and Grease by EPA Method 1664

No anomalies associated with the analysis of these samples were observed.

Diesel and Residual Range Organics by EPA Method 8015B

Relative Percent Difference (RPD) Exceptions:
The RPD criterion for the replicate analysis of Residual Range Organics in sample SF-DODS-013 Dup is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Approved by _____ **Date** 11/13/02

Organochlorine Pesticides by EPA Method 8081A

Second Source Exceptions:
The analysis of Chlorinated Pesticides by EPA 8081 requires the use of dual column confirmation. When the Initial Calibration Verification (ICV) criteria are met for both columns, the higher of the two sample results is generally reported. The primary evaluation criteria were not met on the confirmation column for 4,4'-DDE. The ICV results are reported from the acceptable column. The data quality is not affected. No further corrective action was necessary.

Continuing Calibration Verification Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 1018F003: Endrin, Decachlorobiphenyl, 4,4'-DDD and 4,4'-DDT, Endrin Aldehyde, Endosulfan Sulfate, Endrin Ketone; 1018F020: Decachlorobiphenyl, 4,4'-DDD and 4,4'-DDT, Endrin Aldehyde, Endosulfan Sulfate, Endrin Ketone; 1018F035: Endrin, Decachlorobiphenyl, 4,4'-DDD and 4,4'-DDT, Endrin Aldehyde, Endosulfan Sulfate, Endrin Ketone, Methoxychlor; 1018F051: Endrin, Decachlorobiphenyl, 4,4'-DDD and 4,4'-DDT, Endrin Aldehyde, Endosulfan Sulfate, Endrin Ketone, Methoxychlor. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 1019F037: Endrin Ketone, Endrin Aldehyde, Decachlorobiphenyl; 1019F050: Endrin, 4,4'-DDD, 4,4'-DDT, Endrin Aldehyde, Endosulfan Sulfate, Methoxychlor, Endrin Ketone, Decachlorobiphenyl. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Endosulfan Sulfate has been reported from a CCV using average criteria in sample SF-DODS-057.

Sample Confirmation Notes:
The confirmation comparison criterion of 40% difference for a few analytes was exceeded in some of the samples. The higher of the two values is reported because no evidence of matrix interference was observed, or the lower of the two values was reported because of an apparent interference on the alternate column that produced the higher value. In some instances, the confirmation comparison criteria are not applicable because at least one of the values is below the Method Reporting Limit (MRL). The results are flagged to indicate which results exceeded the 40% difference criterion.

Flag JP - The confirmation comparison criteria are not applicable because at least one of the values is below the Method Reporting Limit (MRL).

Elevated Method Reporting Limits:
The reporting limit is elevated for several analytes in each of the samples. The chromatogram indicated the presence of non-target background components. The matrix interference prevented adequate resolution of the target compounds at the reporting limit. The results are flagged to indicate the matrix interference.

The reporting limit is elevated for gamma-Chlordane, alpha-Chlordane, and Endrin-Ketone in sample SF-DODS-013-Dup. The chromatogram indicated the presence of non-target background components. The matrix interference prevented adequate resolution of the target compounds at the reporting limit. The results are flagged to indicate the matrix interference.

Surrogate Exceptions
The control criteria were exceeded for the following surrogates in Batch QC K2206872-003: Tetrachloro-m-xylene, and Decachlorobiphenyl. All recoveries for surrogates in samples for this work order were within acceptance limits as well as all associated QC. The associated matrix spike recoveries of target compounds were in control, indicating the analysis was in control. The surrogate outlier has been flagged accordingly. No further corrective action was feasible.

Approved by _____ **Date** 11/13/02

Matrix Spike Recovery Exceptions:
The control criteria for the matrix spike recoveries of a few analytes for each of the MS/DMS's were not applicable. The chromatogram indicates non-target matrix background components are contributing to the reported matrix spike concentrations. Thus, the reported recoveries contain a high bias. Based on the magnitude of background contribution, the interference appears to be minimal. Also note the Method Reporting Limit (MRL) for the associated unspiked sample is elevated above the background level.

PCB Aroclors by EPA Method 8082

Second Source Exceptions:
The primary evaluation criterion was exceeded for Aroclor 1016 in the second source verification on the secondary column for Initial Calibration (ICAL) ID CAL2036. However, the second source is acceptable on the primary column verifying the validity of the ICAL standards.

Continuing Calibration Verification (CCV) Exceptions:
The primary evaluation criterion was exceeded for Aroclor 1016 in CCV 1024F037. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Organotin Compounds

Relative Percent Difference (RPD) Exceptions:
The RPD for the replicate analysis of Tri-n-butyl in sample SF-DODS-013 DUP was outside the normal CAS control limits. The variability in the results is attributed to the heterogeneous character of the sample. Samples KWG0208233-5DUP, KWG0208233-6TRP, and K2206977-015 have similar result while sample K2206977-17 is an outlier. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

Continuing Calibration Verification (CCV) Exceptions:
The primary evaluation criterion was exceeded for Tri-n-propyltin in CCVs 1010F059.D and 1010F071.D. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Sample Notes and Discussion
During derivatization, residual water reacted with grignard reagent and resulted in loss of K2206977-15MS and DMS. The project has a MS/DMS and a triplicate sample in another extraction batch. There is sufficient QC for this project, and as a result the samples associated with 6977-15MS and DMS is reported without a MS/DMS. Associated QA/QC, (i.e. Surrogates, LCS) were within acceptance limits. No further corrective action was taken.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration (ICAL) Exceptions:
The primary evaluation criterion was exceeded for the following analytes in ICAL ID CAL2040: 2,6-Dimethylnaphthalene, Acenaphthylene, 2,4,6-Tribromophenol, Pentachlorophenol, Anthracene, Carbazole, Fluoranthene, Benz(a)anthracene, Benzo(a)pyrene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 12.6%. The calibration meets the alternative evaluation criteria.

Internal Standard Exceptions:
The internal standard recovery of Perylene-d12 in sample Batch QCDL was outside control criteria. This analysis was a dilution for Naphthalene and 2-Methylnaphthalene only. The data quality was not affected. No further corrective action was taken.

Approved by _____ **Date** 11/13/02

Sample Notes and Discussion

The advisory criterion was exceeded for Anthracene in Standard Reference Material (SRM) KWG0208274-6. As per the CAS/Kelso Standard Operating Procedure (SOP) for this method, these compounds are not included in the subset of analytes used to control the analysis. The recovery information reported for these analytes is for advisory purposes only (i.e. to provide additional detail related to the performance of each individual compound). No further corrective action was required.

Approved by _____ **Date** 11/13/02

K220697A

SAIC
18706 North Creek Parkway, Suite 110
Bothell, Washington 98011
425/485-5800 • FAX: 485-5566

MASTER SAMPLE LOG AND CHAIN OF CUSTODY RECORD

Project No.: SF-DODS Project Mgr.: TED TURK
Project Name: SF-DODS (SEAFLOOR MONITORING)
Project Location: GULF of the FARALLONS
Client Name: USACE / USEPA

Sampling Location	Sample Number	Sample Depth	Sample Matrix	Sampling Date	Sampling Time	Sample Collector(s)	OG / G	SIM / PAH	PESTICIDES	8082 - PCB	TM/Cr6/ADH/Hardness	ORGANOTIN	Sample Containers/ Preservatives: 1 L AMBER GLASS	1 L HDPE	1 L Nalgene Plastic	Comments
SF-DODS-	RB		AQ	9/26/02	1845	JN/TH	2	2	1	1			1			RINSATE BLANK
	RB		"	"	"	"					1			1		
	RB		"	"	"	"						1			1	

Shipment No.:
Shipping Container No.:
Custody Seal No.:
Date Shipped:
Carrier:
Shipper:
Shipper Bill No.:

RELINQUISHED BY:
Signature:
Date/Time: 9/30/02 1000
Affiliation: SAIC

RECEIVED BY:
Signature: Brian Black
Date/Time: 10/1/02 1200
Affiliation: CAS

RELINQUISHED BY:
Signature:
Date/Time:
Affiliation:

RECEIVED BY:
Signature:
Date/Time:
Affiliation:

• White: Lab Returns to Onginator Upon Receipt of Samples. • Canary: Lab Retains; • Pink: Lab Returns to Project Manager with Final Report; • Goldenrod: Retained by Sampler

K226977

SAIC
18706 North Creek Parkway, Suite 110
Bothell, Washington 98011
425/485-5800 • FAX: 485-5566

MASTER SAMPLE LOG AND CHAIN OF CUSTODY RECORD

Project No.: SF-DODS Project Mgr.: TED TURK
Project Name: SF-DODS SEA FLOOR MONITORING
Project Location: Gulf of the FARALLONS
Client Name: USACE / USEPA

Sampling Location	Sample Number	Sample Depth	Sample Matrix	Sampling Date	Sampling Time	Sample Collector(s)	TS/TUS/O&G/TPH/PAH	Butyltins/TOC/Tm (HK)	Pest & PCB	Archive	Sulfides	Grain Size	16 oz w/m Glass Jar	16oz w/m Glass Jar	4oz w/m Glass Jar	16oz w/m Glass Jar	Comments
SF-DODS	-Ø16	2693	SED	9/21/02	2115	E, TH	1			1	1	1	1	1	1	1	1
	-Ø17	2775		9/21/02	2329		1			1	1	1	1	1	1	1	2
	-Ø19	3000	*	9/22/02	0148		1			1	1	1	1	1	1	1	3
	-Ø20	3050		9/22/02	0625		1			1	1	1	1	1	1	1	4
	-Ø10	2739		9/22/02	0846		1			1	1	1	1	1	1	1	5
	-ØØ6	2697		9/22/02	1055		1			1	1	1	1	1	1	1	6
	-Ø27	2825		9/23/02	1924		1			1	1	1	1	1	1	1	7
	-Ø57	2709		9/23/02	2390		1			1	1	1	1	1	1	1	8
	-Ø92	2850		9/24/02	0131		1			1	1	1	1	1	1	1	9
	-Ø50	2160		9/24/02	0440		1			1	1	1	1	1	1	1	10
	-116	2475		9/25/02	2140		1			1	1	1	1	1	1	1	11
	-Ø64	3136		9/25/02	2325		1			1	1	1	1	1	1	1	12
	-Ø23	2954		9/26/02	2037		1			1	1	1	1	1	1	1	13
	-114	2420		9/27/02	2420		1			1	1	1	1	1	1		14
	-Ø13	2902		9/27/02	0623		1			1	1	1	1	1	1	1	15
* LABEL ON JAR		SAIS: 9/21/02				Σ →	15			15	15	15	15	15	15	05	

Shipment No.:
Shipping Container No.:
Custody Seal No.:
Date Shipped:
Carrier:
Shipper:
Shipper Bill No.:

RELINQUISHED BY:
Signature: [signature]
Date/Time: 9/30/02 1000
Affiliation: SAIC

RECEIVED BY:
Signature: Tracy Black
Date/Time: 10/01/02 1200
Affiliation: CAS

RELINQUISHED BY:
Signature:
Date/Time:
Affiliation:

RECEIVED BY:
Signature:
Date/Time:
Affiliation:

• White: Lab Returns to Originator Upon Receipt of Samples; • Canary: Lab Retains; • Pink: Lab Returns to Project Manager with Final Report; • Goldenrod: Retained by Sampler

Columbia Analytical Services Inc.
Cooler Receipt And Preservation Form

Project/Client SHIC Work Order K22 06977

Cooler received on 10/01/12 and opened on 10/01/12 by TBlack

1.	Were custody seals on outside of cooler? If yes, how many and where? 1 front					(Y)	N
2.	Were seals intact and signature & date correct?					(Y)	N
3.	COC #						
	Temperature of cooler(s) upon receipt:	1.7	1.4	1.9	1.0		
	Temperature Blank:	0.4	0.1	n/a	-0.1		
4.	Were custody papers properly filled out (ink, signed, etc.)?					Y	N
5.	Type of packing material present						
6.	Did all bottles arrive in good condition (unbroken)?					Y	(N)
7.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?					(Y)	N
8.	Did all bottle labels and tags agree with custody papers?					(Y)	N
9.	Were the correct types of bottles used for the tests indicated?					(Y)	N
10.	Were all of the preserved bottles received at the lab with the appropriate pH?					(Y)	N
11.	Were VOA vials checked for absence of air bubbles, and if present, noted below?					~~Y~~	~~N~~
12.	Did the bottles originate from CAS/K or a branch laboratory?					(Y)	N
13.	Are CWA Microbiology samples received with > ½ the 24 hr. hold time remaining from collection?					~~Y~~	~~N~~
14.	Was CL2/Residual negative?					~~Y~~	~~N~~

Explain any discrepancies: 1 liter jar for SF-0005-50 9/24/12 0440 rec'd w/ bottom cracked out - ABB to transfer 90% of sample to new jar.

RESOLUTION:

Samples that required preservation or received out of temperature:

Sample ID	Reagent	Volume	Lot Number	Bottle Type	Rec'd out of Temperature	Initials

CHECKLIST FOR CONVENTIONAL VARIABLES IN SEDIMENT

Project Name SF-DODS Fall 2002 Survey

SAIC Project No. 01-0440-04-1034-600

Lab Columbia Analytical Services, Inc.

Lab # Batch # 1: K2206977-001-015 (Samples: SF-DODS-006, 010, 013, 013-Dup, 016, 017, 019, 020, 023, 027, 050, 057, 064, 092, 114, and 116)

Responsible Technician Harvey Jacky, Project Chemist

Reviewed by Michelle Payne Date checklist prepared 11/27/02

Date: Sampled 09/21/02 – 09/27/02

Received by lab 10/01/02

Analysis began 10/10/02

Problems noted (e.g., deviations from prescribed methods, analytical problems)

The Relative Percent Difference (RPD) criterion for the replicate analysis of sulfide in sample SF-DODS-013-Dup is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject tot the same accuracy and precision criteria as results derived form measurements higher on the calibration range for the method.

COMPLETENESS AND HOLDING CONDITIONS

	TOC	Total Sulfides	Total Solids	Grain Size Distribution	TVS
Method (identify)	ASTM04129-82M	EPA 9030M	160.3M	D422 Mod	160.4 M
# Samples submitted	16	16	16	16	16
# Samples analyzed	16	16	16	16	16

Holding conditions acceptable?[a] (Y/N) Yes

If no, identify samples

FORMAT

Standard data report sheet

Concentrations in proper units and significant figures Yes

Sample detection limit provided, when applicable (total sulfides, ammonia) Yes – provided for those analytes that are undetected

Qualifiers defined (e.g., U = undetected)

U = The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.

QA/QC SAMPLES

Method Blank

TOC Total # 2

Frequency 2 per batch of 16 samples
(minimum 1 per 20 samples)[b]

Amount detected in blank None (0.02 U)
(not a PSEP control limit)

Certified Reference Materials

TOC Total # 2

Frequency 2 per batch of 16 samples
(minimum 1 per survey)

CRM used

Within 95% confidence interval?

Recovery was within laboratory control limits

(not a PSEP control limit)

Analytical Replicates

	TOC	Total Sulfides	Total Solids	Grain Size Distribution
Total # of samples	16	16	16	16
Frequency (minimum 1 duplicate per 20 samples)	1	1	2	1
Relative standard deviation (RSD)	1.0	67*	<1 2	Gravel: 0 Sand: 4.1 Silt: 3.6 Clay: 8.8

* See problems noted

CHECKLIST FOR CONVENTIONAL VARIABLES IN SEDIMENT (cont.)

[a] PSDDA recommended holding times for sediment conventionals

Variable	Refrigerated at 4°C	Frozen at –18°C
Grain Size	6 months	not recommended[1]
Total Solids, Total Volatile Solids, and Total Organic Carbon	14 days	6 months
Total Sulfides	7 days	not applicable
Ammonia	7 days	not applicable
Acid Volatile Sulfides[2]	no guidance	no guidance

[1] Samples most not be frozen or dried before analysis

[2] Allen, et al. (1991) recommend 14-day holding time at 4°C

CHECKLIST FOR METALS IN SEDIMENT

Project Name SF-DODS Fall 2002 Survey

SAIC Project No. 01-0440-04-1034-600

Lab Columbia Analytical Services, Inc.

Lab # Batch # 1: K2206977-001-017 (Samples: SF-DODS-006, 010, 013, 013-DUP, 016, 017, 019, 020, 023, 027, 050, 057, 064, 092, 114, and 116 and SF-DODS-RB)

Responsible Technician Harvey Jacky, Project Chemist

Reviewed by Michelle Payne Date checklist prepared 11/26/02

Date: Sampled 9/21/02 – 9/27/02

Received by lab 10/01/02

Analysis began Digested: 10/14/02 – 10/18/02 Analyses: 10/18/02 – 10/22/02

Problems noted (e.g., deviations from prescribed methods, analytical problems)

None reported by the lab.

All required documents submitted?[a] (Y/N) Yes

Digestion procedure [Total Acid Digest (TAD) or Strong Acid Digest (SAD)] SAD

COMPLETENESS AND HOLDING CONDITIONS

Samples submitted 16 # Samples analyzed 16

Holding conditions acceptable? (Y/N) [2 years frozen -18°C and 6 months 4°C for metals except mercury; 28 days frozen and 7 days 4°C (in glass) for mercury] Yes

If no, identify samples

CHECKLIST FOR METALS IN SEDIMENT (cont.)

FORMAT

Standard data report sheet

Concentrations in proper units and significant figures Yes

Qualifiers defined (e.g., U = undetected)

B = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

U = The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.

Sample detection limits (DL) provided for each analyte? (Y/N) Yes

QA/QC SAMPLES

Preparation Blank

Total # 2

Frequency[b] 2 per batch of 16 samples
(minimum 5% or 1 per batch, whichever is more frequent)[c]

Chemicals observed above detection limits in one or more blanks[c]

Chromium (0.21 mg/kg), Nickel (0.20 mg/kg)

Certified Reference Materials

Total # 2

Frequency[b] 2 per batch of 16 samples
(minimum 5% or 1 per batch, whichever is more frequent)[c]

CRM used ERA Lot #246

Chemicals outside 70-130% recovery[c] none

(for chemicals without certified values, use matrix spike results)

CHECKLIST FOR METALS IN SEDIMENT (cont.)

Analytical Replicates

Total # 2 (SF-DODS-16D and SF-DODS-13-Dup)

Frequency[b] 2 per batch of 16 samples
(minimum 5% or 1 per batch, whichever is more frequent)[c]

Samples/chemicals with >20% relative percent difference (RPD) or coefficient of variation (CV)[c]

Yes

Chemical	Sample Value (mg/kg)	Duplicate Value (mg/kg)	% RPD
Selenium	0.2 U	0.6 B	200

Matrix Spikes

Total # 2 (SF-DODS-16S and SF-DODS-13S)

Frequency[b] 2 per batch of 16 samples
(minimum 5% or 1 per batch, whichever is more frequent)[c]

Chemicals with recovery outside 75-125%[c] None

Detection Limits

Did any DL exceed SL? (Y/N) N/A

If yes, detection limits exceeding SL (identify samples)

Preparation Blanks (Relative blank contamination)

Are sample results <5 times blank values in any samples? (Y/N) No

If yes identify elements and samples

CHECKLIST FOR METALS IN SEDIMENT (cont.)

[a] Metals:
For metals, the data report package for analyses of each sample should include the following:

- Tabulated results in units as specified for each matrix in the analytical protocols, validated and signed in original by the laboratory manager
- Any data qualifications and explanation for any variance from the analytical protocols
- Results for all of the QA/QC checks initiated by the laboratory
- Tabulation of instrument and method detection limits.

All contract laboratories are required to submit metals results that are supported by sufficient backup data and quality assurance results to enable independent QA reviewers to conclusively determine the quality of the data. The laboratories should be able to supply legible photocopies of original data sheets with sufficient information to unequivocally identify:

- Calibration results
- Calibration and preparation blanks
- Samples and dilutions
- Duplicates and spikes
- Any anomalies in instrument performance or unusual instrumental adjustments.

[b] For batches of 5 samples or less, the minimum QA checks should be a blank and the analysis of a CRM (and matrix spikes for any analytes not certified in the CRM). In general, the priority of QA checks for batches of ≤5 samples should be as follows: CRM > analytical replicate > matrix spikes.

[c] PSEP control limit is 80-120% recovery.

CHECKLIST FOR PCB COMPOUNDS IN SEDIMENT

Project Name SF-DODS Fall 2002 Survey

SAIC Project No. 01-0440-04-1034-600

Lab Columbia Analytical Services, Inc.

Lab # Batch # 1: K2206977-001-017 (Samples: SF-DODS-006, 010, 013, 013-DUP, 016, 017, 019, 020, 023, 027, 050, 057, 064, 092, 114, and 116)

Responsible Technician Harvey Jacky, Project Chemist

Reviewed by Michelle Payne Date checklist prepared 11/25/02

Date: Sampled 9/21/02 – 9/27/02

Received by lab 10/01/02

Analysis began Extraction: 10/04/02 & 10/14/02 Analysis: 10/25/02, 10/27/02, 10/28/02

Problems noted (e.g., deviations from prescribed methods, analytical problems)

- The primary evaluation criterion was exceeded for Aroclor 1016 in the second source verification on the secondary column for Initial Calibration (ICAL) ID CAL2036. However, the second source is acceptable on the primary column verifying the validity of the ICAL standards.
- The primary evaluation criterion was exceeded for Aroclor 1016 in CCV 1024F037. I accordance with CAS standard operation procedures, the alternative evaluation specified in the DPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

All required documents submitted?[a] (Y/N) Yes

Analytical method SW 8082

COMPLETENESS AND HOLDING CONDITIONS

	# Samples Submitted	# Samples Analyzed
Pesticides/PCB	16	16

Holding conditions acceptable? (Y/N) (1 year for frozen sediment or 14 days at 4°C until extraction: extracts must be processed within 40 days)[b] Yes (see attached worksheet)

If no, identify samples

Extract conditions acceptable? (Y/N) (1 year for frozen sediment or 14 days at 4°C)[b] No

If no, identify samples SFDODS 13 Dup was extracted on 10/14/02, the 17th day.

FORMAT

Standard data report sheet

Concentrations in proper units and significant figures Yes

Qualifiers defined (e.g., U = undetected)

J = Estimated concentration. Value less than the Method Reporting Limit, but greater than the Method Detection Limit.

U = The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.

QA/QC SAMPLES

Method Blank

Total # 2

Frequency 2 per extraction batch of 16 samples
(minimum 1 per extraction batch)[c]

Chemicals detected above 5 µg total (for phthalates) and 25 µg total[d]
(for other organic compounds; lower levels may be appropriate for pesticides and PCBs)

None

Certified Reference Materials

Total # 2

Frequency 1 per batch of 15 samples, 1 per batch of 1 sample
(<50 samples - 1 per set of samples submitted to lab; >50 samples - 1 per 50 samples analyzed)[c]

CRM used

Chemicals outside 95% confidence interval (for certified values)[d,e]

The PCB recovery was within laboratory control limits.

Analytical Replicates

Total # 1

Frequency 1 per batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; =20 samples - 1 triplicate and additional duplicate for minimum of 5% total replication)[c]

Samples/chemicals with >35% RPD or CV[e]

None

Matrix Spikes (not required for A/B/N if isotope dilution used)

Total # 2 (MS/MSD)

Frequency 2 per batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; =20 samples - 5% of total samples)[c]

Chemicals outside 50-150% recovery[e] None

Detection Limits

Did any DL exceed SL? (Y/N) N/A

If yes, detection limits exceeding SL (identify samples)

PCBs

Surrogate Recovery (Pesticides/PCBs)

Were surrogates added to all samples?[c] (Y/N) Yes

Identify samples with <60 percent surrogate recovery[e]

None

Method Blanks (Relative blank contamination)

Were sample concentrations less than 5 times blank concentrations? (Y/N) No
If yes, identify compounds and samples

[a] Organic Compounds

The following documentation is needed for organic compounds:

- A cover letter referencing or describing the procedure used and discussing any analytical problems
- Reconstructed ion chromatograms for GC/MS analyses for each sample
- Mass spectra of detected target compounds (GC/MS) for each sample and associated library spectra
- GC/ECD and/or GC/flame ionization detection chromatograms for each sample
- Raw data quantification reports for each sample
- A calibration data summary reporting calibration range used [and decafluoro-triphenylphosphine (DFTPP) and bromofluorobenzene (BFB) spectra and quantification report for GC/MS analyses]
- Final dilution volumes, sample size, wet-to-dry ratios, and instrument detection limit
- Analyte concentrations with reporting units identified (to two significant figures unless otherwise justified)
- Quantification of all analytes in method blanks (ng/sample)
- Method blanks associated with each sample
- Recovery assessments and a replicate sample summary (laboratories should report all surrogate spike recovery data for each sample; a statement of the range of recoveries should be included in reports using these data)
- Data qualification codes and their definitions

[b] Prototype sampling and analysis plan provided by David Fox, U.S. Army Corps of Engineers on 7 August 1991.

[c] For batches of 5 samples or less, the minimum QA checks should be a blank and the analysis of a CRM (and matrix spikes for any analytes not certified in the CRM). In general, the priority of QA checks for batches of =5 samples should be as follows: CRM > analytical replicate > matrix spikes.

[d] PSEP control limit.

[e] Control limits based on PSDDA Chemistry QA/QC and Streamlining Workshop held 24 January 1991, U.S. Army Corps of Engineers, Seattle District

CHECKLIST FOR PESTICIDES IN SEDIMENT

Project Name SF-DODS Fall 2002 Survey

SAIC Project No. 01-0440-04-1034-600

Lab Columbia Analytical Services, Inc.

Lab # Batch # 1: K2206977-001-017 (Samples: SF-DODS-006, 010, 013, 013-DUP, 016, 017, 019, 020, 023, 027, 050, 057, 064, 092, 114, and 116)

Responsible Technician Harvey Jacky, Project Chemist

Reviewed by Michelle Payne Date checklist prepared 11/25/02

Date: Sampled 9/21/02 – 9/27/02

Received by lab 10/01/02

Analysis began Extraction: 10/02/02, 10/04/02, & 10/14/02

Analysis: 10/18/02, 10/19/02, 10/20/02, & 10/26/02

Problems noted (e.g., deviations from prescribed methods, analytical problems)

See case narrative. Second source and continuing calibration verification exceptions noted. EPA evaluation standards met. Confirmation comparison criterion of 40% difference for a few analytes was exceeded in some samples – flagged as JP. Elevated MRL due to matrix interference for several analytes in each sample. The results are flagged to indicate matrix interference. Control criteria for surrogates Tetrachlor-m-xylene and Decachlorobiphenyl exceeded, but all sample surrogate recoveries were within acceptance limits as well as associated QC. The surrogate outlier has been flagged accordingly.

All required documents submitted?[a] (Y/N) Yes

Analytical method EPA 8081

COMPLETENESS AND HOLDING CONDITIONS

	# Samples Submitted	# Samples Analyzed
Pesticides/PCB	16	16

Holding conditions acceptable? (Y/N) (1 year for frozen sediment or 14 days at 4°C until extraction: extracts must be processed within 40 days)[b] Yes (see attached worksheet)

If no, identify samples

Extract conditions acceptable? (Y/N) (1 year for frozen sediment or 14 days at 4°C)[b] No

If no, identify samples SFDODS 13 Dup was extracted on 10/14/02, the 17th day.

FORMAT

Standard data report sheet

Concentrations in proper units and significant figures Yes

Qualifiers defined (e.g., U = undetected)

J = Estimated concentration. The value is less than the Method Reporting Limit, but greater than the Method Detection Limit.

U = The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.

JP = The confirmation comparison criteria are not applicable because at least one of the values is below the Method Reporting Limit (MRL).

QA/QC SAMPLES

Method Blank

Total # 2

Frequency 2 per extraction batch of 16 samples
(minimum 1 per extraction batch)[c]

Chemicals detected above 5 µg total (for phthalates) and 25 µg total[d]
(for other organic compounds; lower levels may be appropriate for pesticides and PCBs)

None, however Toxaphene had an MRL of 50 µg and an MDL of 9.2 µg.

Certified Reference Materials

Total # 2

Frequency 2 per batch of 16 samples
(<50 samples - 1 per set of samples submitted to lab; >50 samples - 1 per 50 samples analyzed)[c]

CRM used

Chemicals outside 95% confidence interval (for certified values)[d,e]

The pesticide recoveries were with laboratory control limits

Analytical Replicates

Total # 1

Frequency 1 per batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; =20 samples - 1 triplicate and additional duplicate for minimum of 5% total replication)[c]

Samples/chemicals with >35% RPD or CV[e]

Alpha-BHC, aldrin, endosulfan, DDE, DDD, DDT, toxaphene, however in each case RPD made with an undetected concentration (MDL).

Matrix Spikes (not required for A/B/N if isotope dilution used)

Total # 2 (SF DODS-064)

Frequency 2 per batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; =20 samples - 5% of total samples)[c]

Chemicals outside 50-150% recovery[e] None, however some compounds were outside control criteria (alpha-, beta-, gamma-BHC, endosulfan, a-chlordane, methoxychlor).

Detection Limits

Did any DL exceed SL? (Y/N) N/A

If yes, detection limits exceeding SL (identify samples)

Pesticides

Surrogate Recovery (Pesticides)

Were surrogates added to all samples?[c] (Y/N) Yes

Identify samples with <60 percent surrogate recovery[e]

None

Method Blanks (Relative blank contamination)

Were sample concentrations less than 5 times blank concentrations? (Y/N) No
If yes, identify compounds and samples

[a] Organic Compounds

The following documentation is needed for organic compounds:

- A cover letter referencing or describing the procedure used and discussing any analytical problems
- Reconstructed ion chromatograms for GC/MS analyses for each sample
- Mass spectra of detected target compounds (GC/MS) for each sample and associated library spectra
- GC/ECD and/or GC/flame ionization detection chromatograms for each sample
- Raw data quantification reports for each sample
- A calibration data summary reporting calibration range used [and decafluoro-triphenylphosphine (DFTPP) and bromofluorobenzene (BFB) spectra and quantification report for GC/MS analyses]
- Final dilution volumes, sample size, wet-to-dry ratios, and instrument detection limit
- Analyte concentrations with reporting units identified (to two significant figures unless otherwise justified)
- Quantification of all analytes in method blanks (ng/sample)
- Method blanks associated with each sample
- Recovery assessments and a replicate sample summary (laboratories should report all surrogate spike recovery data for each sample; a statement of the range of recoveries should be included in reports using these data)
- Data qualification codes and their definitions

[b] Prototype sampling and analysis plan provided by David Fox, U.S. Army Corps of Engineers on 7 August 1991.

[c] For batches of 5 samples or less, the minimum QA checks should be a blank and the analysis of a CRM (and matrix spikes for any analytes not certified in the CRM). In general, the priority of QA checks for batches of =5 samples should be as follows: CRM > analytical replicate > matrix spikes.

[d] PSEP control limit.

[e] Control limits based on PSDDA Chemistry QA/QC and Streamlining Workshop held 24 January 1991, U.S. Army Corps of Engineers, Seattle District

CHECKLIST FOR SEMIVOLATILE ORGANIC COMPOUNDS IN SEDIMENT

Project Name SF-DODS Fall 2002 Survey

SAIC Project No. 01-0440-04-1034-600

Lab Columbia Analytical Services, Inc.

Lab # Batch # 1: K2206977-001-017 (Samples: SF-DODS-006, 010, 013, 013-DUP, 016, 017, 019, 020, 023, 027, 050, 057, 064, 092, 114, and 116 and SF-DODS-RB)

Responsible Technician Harvey Jacky, Project Chemist

Reviewed by Michelle Payne Date checklist prepared 11/26/02

Date: Sampled 9/21/02 – 9/27/02

Received by lab 10/1/02

Analysis began Extraction: 10/03/02 – 10/17/02 Analysis: 10/12/02 – 10/25/02

Problems noted (e.g., deviations from prescribed methods, analytical problems)

- The primary evaluation criterion was exceeded for several analytes in Initial Calibration ID CAL2040. In accordance with CAS standard operation procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 12.6%. The calibration meets the alternative evaluation criteria.
- The internal standard recovery of Perylene-d12 in sample Batch QCDL was outside control criteria. This analysis was a dilution for Naphthalene and 2-Methylnaphthalene only. The data quality was not affected. No further corrective action was taken.
- The advisory criterion was exceeded for Anthracene in Standard Reference Material (SRM) KWG0208274-6. As per the CAS/Kelso Standard Operation Procedure (SOP) for this method, these compounds are not included in the subset of analytes used to control the analysis. The recovery information reported for these analytes is for advisory purposes only (i.e. to provide additional detail related to the performance of each individual compound). No further corrective action was required.

All required documents submitted?[a] (Y/N) Yes

Analytical method SW 3550/8270

COMPLETENESS AND HOLDING CONDITIONS

	# Samples Submitted	# Samples Analyzed
A/B/N	16	16

Holding conditions acceptable? (Y/N) (1 year for frozen sediment or 14 days at 4°C until extraction: extracts must be processed within 40 days)[b] Yes

If no, identify samples _____

Extract conditions acceptable? (Y/N) (1 year for frozen sediment or 14 days at 4°C)[b] Yes

If no, identify samples _____

FORMAT

Standard data report sheet

Concentrations in proper units and significant figures Reported to two significant figures

Qualifiers defined (e.g., U = undetected)

J = Estimated concentration. The value is less than the Method Reporting Limit, but greater than the Method Detection Limit.

U = The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.

QA/QC SAMPLES

Method Blank

Total # 3

Frequency 3 per extraction batch of 16 samples
(minimum 1 per extraction batch)[c]

Chemicals detected above 5 µg total (for phthalates) and 25 µg total[d]
(for other organic compounds; lower levels may be appropriate for pesticides and PCBs)

None

Certified Reference Materials

Total # 3

Frequency 3 per extraction batch of 16 samples
(<50 samples - 1 per set of samples submitted to lab; >50 samples - 1 per 50 samples analyzed)[c]

CRM used KWG0207798-6, KWG0208116-10, KWG0208274-6

Chemicals outside 95% confidence interval (for certified values)[d,e]

Anthracene fell outside of the advisory criterion for SRM KWG0208274-6.

Result = 660, advisory limit = 720-3150

Analytical Replicates

Total # 3 (MSD)

Frequency 1 per extraction batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; =20 samples - 1 triplicate and additional duplicate for minimum of 5% total replication)[c]

Samples/chemicals with >35% RPD or CV[e]

None

Matrix Spikes (not required for A/B/N if isotope dilution used)

Total # 3

Frequency 3 per extraction batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; =20 samples - 5% of total samples)[c]

Chemicals outside 50-150% recovery[e] 2 (see below), but within laboratory control limits

Compound	MS % Recovery	MSD % Recovery	LCL
Naphtalene	44%	49%	30-97%
2-Methylnaphthalene	49%	54%	33-96%

Detection Limits

Did any DL exceed SL? (Y/N) N/A

If yes, detection limits exceeding SL (identify samples)

Surrogate Recovery (A/B/N)

Were surrogates added to all samples?[c] (Y/N) Yes

Identify compounds with <50 percent recovery[d,e] (also identify samples)

None

Sample #	Compound	% Recovery	LCL

Method Blanks (Relative blank contamination)

For target compounds other than phthalates, were sample concentrations less than 5 times blank concentrations? (Y/N) No

If yes, identify compounds and samples

For phthalates, were sample concentrations less than 10 times blank concentrations?[d] (Y/N) No

If yes, identify compounds and samples

---

[a] Organic Compounds

The following documentation is needed for organic compounds:

- A cover letter referencing or describing the procedure used and discussing any analytical problems
- Reconstructed ion chromatograms for GC/MS analyses for each sample
- Mass spectra of detected target compounds (GC/MS) for each sample and associated library spectra
- GC/ECD and/or GC/flame ionization detection chromatograms for each sample
- Raw data quantification reports for each sample
- A calibration data summary reporting calibration range used [and decafluoro-triphenylphosphine (DFTPP) and bromofluorobenzene (BFB) spectra and quantification report for GC/MS analyses]
- Final dilution volumes, sample size, wet-to-dry ratios, and instrument detection limit
- Analyte concentrations with reporting units identified (to two significant figures unless otherwise justified)
- Quantification of all analytes in method blanks (ng/sample)
- Method blanks associated with each sample
- Recovery assessments and a replicate sample summary (laboratories should report all surrogate spike recovery data for each sample; a statement of the range of recoveries should be included in reports using these data)
- Data qualification codes and their definitions

[b] Prototype sampling and analysis plan provided by David Fox, U.S. Army Corps of Engineers on 7 August 1991.

[c] For batches of 5 samples or less, the minimum QA checks should be a blank and the analysis of a CRM (and matrix spikes for any analytes not certified in the CRM). In general, the priority of QA checks for batches of =5 samples should be as follows: CRM > analytical replicate > matrix spikes.

[d] PSEP control limit.

[e] Control limits based on PSDDA Chemistry QA/QC and Streamlining Workshop held 24 January 1991, U.S. Army Corps of Engineers, Seattle District

CHECKLIST FOR ORGANOTIN COMPOUNDS IN SEDIMENT

Project Name SF-DODS Fall 2002 Survey

SAIC Project No. 01-0440-04-1034-600

Lab Columbia Analytical Services, Inc.

Lab # Batch # 1: K2206977-001-017 (Samples: SF-DODS-006, 010, 013, 013-DUP, 016, 017, 019, 020, 023, 027, 050, 057, 064, 092, 114, and 116 and SF-DODS-RB)

Responsible Technician Harvey Jacky, Project Chemist

Reviewed by Michelle Payne Date checklist prepared 11/26/02

Date: Sampled 09/21/02– 09/27/02

Received by lab 10/01/02

Analytical extraction: 10/01/02, 10/04/02, 10/07/02, 10/16/02 Analysis: 10/11/02, 10/15/02, 10/30/02

Problems noted (e.g., deviations from prescribed methods, analytical problems)

The RPD for the replicate analysis of Tri-n-Butyl in sample SF-DODS-013-DUP was outside the normal CAS control limits. The variability in the results is attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

During derivatization, residual water reacted with grignard reagent and resulted in loss of K2206977-15MS and DMS. The project has a MS/DMS and a triplicate sample in another extraction batch. There is sufficient QC for this project, and as a result the samples associates with 6977-15MS and DMS is reported without a MS/DMS. Associated AQ/QC (i.e. Surrogates, LCS) were within acceptance limits. No further corrective action was taken.

All required documents submitted?[a] (Y/N) Yes

Analytical method Krone *et al.*, 1989 (EPA 3520C)

COMPLETENESS AND HOLDING CONDITIONS

	# Samples Submitted	# Samples Analyzed
Butyltins	16	16

Holding conditions acceptable? (Y/N) (14 days at 4°C) Yes, with the exception of SFDODS 13 Dup, extracted 10/16/02, the 19th day.

FORMAT

Standard data report sheet

Concentrations in proper units and significant figures Yes

Qualifiers defined (e.g., U = undetected)

J = Estimated concentration. The value is less than the Method Reporting Limit, but greater than the Method Detection Limit.

U = The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.

QA/QC SAMPLES

Method Blank

Total # 3

Frequency 3 per batch of 16 samples
(minimum 1 per batch of samples analyzed)[b]

Chemical detected:

None

For target compounds, were sample concentrations less than 5 times

blank concentrations?[e] (Y/N) No

Certified Reference Materials

Total # 1

Frequency 1 per batch of 16 samples
(1 per batch of samples analyzed)[b]

CRM used

Chemicals outside 95% confidence interval (for certified values)[e]

Recoveries were within laboratory control limits

Analytical Replicates

Total # 1

Frequency 1 per batch of 16 samples
(<20 samples - 1 per set of samples submitted to lab; ≥20 samples - 1 triplicate
and additional duplicate for minimum of 5% total replication)[c]

Samples/chemicals with >35% RPD or CV[e]

Tri-n-butyltin (141%) See Problems noted.

Matrix Spikes

Total # 1 MS/MSD

Frequency 1 per batch of 16 samples
(1 per batch of samples analyzed)[b]

Chemicals outside 50-150% recovery[d]

Detection Limits

Did any DL exceed SL? (Y/N) N/A

Internal Standard/Surrogate Recovery

Were surrogates or internal standards added to all samples?[b] (Y/N) Yes

Identify compounds outside 50-150% recovery[d] (also identify samples)

Additional comments regarding data quality

[a] The following documentation is needed for a QA2 review:

- A cover letter referencing or describing the procedure used and discussing any analytical problems
- GC/flame photometric detection chromatograms for each sample
- Raw data quantification reports for each sample
- A calibration data summary reporting calibration range used
- Final dilution volumes, sample size, wet-to-dry ratios, and instrument detection limit
- Analyte concentrations with reporting units identified (to two significant figures unless otherwise justified)
- Method blanks
- Recovery assessments and a replicate sample summary (laboratories should report all surrogate spike recovery data for each sample; a statement of the range of recoveries should be included in reports using these data)
- Data qualification codes and their definitions

[b] Laboratory Method MSL-M-4, Analysis of Butyltins in Sediment and Tissue, based on Unger et. al, 1986.

[c] For batches of 5 samples or less, the minimum QA checks should be a blank and the analysis of a CRM (and matrix spikes for any analytes not certified in the CRM). In general, the priority of QA checks for batches of ≤5 samples should be as follows: CRM > analytical replicate > matrix spikes.

[d] PSDDA recommended limits for organics and recommended limits for analysis of tributyltin in sediment pore water.

[e] PSDDA recommended limits for organics

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/27/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-114
Lab Code: K2206977-014

Sand Fraction: Weight (Grams)	2.4595
Sand Fraction: Weight Recovered (Grams)	2.3167
Sand Fraction: Percent Recovery	94.2

Weight as received (Grams)	67.6894
Percent Solids	35.4
Weight Oven-Dried (Grams)	23.9620

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0633	0.26
Sand, Very Coarse	0.850 mm	20	0.1179	0.49
Sand, Coarse	0.425 mm	40	0.1223	0.51
Sand, Medium	0.250 mm	60	0.2994	1.25
Sand, Fine	0.106 mm	140	1.0095	4.21
Sand, Very Fine	0.075 mm	200	0.5707	2.38
Clay			7.5950	31.7
Silt			14.2550	59.5
		Total	24.0331	100

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/27/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-013
Lab Code: K2206977-015

Sand Fraction: Weight (Grams)	15.0580
Sand Fraction: Weight Recovered (Grams)	14.8365
Sand Fraction: Percent Recovery	98.5

Weight as received (Grams)	72.9323
Percent Solids	51.0
Weight Oven-Dried (Grams)	37.1955

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0863	0.23
Gravel, Fine	2.00 mm	10	0.4772	1.28
Sand, Very Coarse	0.850 mm	20	1.3720	3.69
Sand, Coarse	0.425 mm	40	1.1704	3.15
Sand, Medium	0.250 mm	60	5.7559	15.5
Sand, Fine	0.106 mm	140	4.8878	13.1
Sand, Very Fine	0.075 mm	200	0.7555	2.03
Clay			11.6200	31.2
Silt			11.9150	32.0
		Total	38.0401	102

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/27/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-013 Dup
Lab Code: K2206977-017

Sand Fraction: Weight (Grams)	8.1548
Sand Fraction: Weight Recovered (Grams)	7.9568
Sand Fraction: Percent Recovery	97.6

Weight as received (Grams)	32.5704
Percent Solids	59.9
Weight Oven-Dried (Grams)	19.5097

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.2380	1.22
Gravel, Fine	2.00 mm	10	0.4069	2.09
Sand, Very Coarse	0.850 mm	20	0.6162	3.16
Sand, Coarse	0.425 mm	40	0.7454	3.82
Sand, Medium	0.250 mm	60	2.9246	15.0
Sand, Fine	0.106 mm	140	2.6092	13.4
Sand, Very Fine	0.075 mm	200	0.3475	1.78
Clay			5.8650	30.1
Silt			5.9900	30.7
		Total	19.7428	101

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/21-27/02
Sample Matrix:	Sediment	**Date Received:**	10/1/2002

Solids, Total Volatile

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	160.4M	Basis:	DRY
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
SF-DODS-016	K2206977-001	10/10/2002	6.00	
SF-DODS-017	K2206977-002	10/10/2002	3.89	
SF-DODS-019	K2206977-003	10/10/2002	7.82	
SF-DODS-020	K2206977-004	10/10/2002	9.40	
SF-DODS-010	K2206977-005	10/10/2002	6.90	
SF-DODS-006	K2206977-006	10/10/2002	8.79	
SF-DODS-027	K2206977-007	10/10/2002	8.34	
SF-DODS-057	K2206977-008	10/10/2002	7.12	
SF-DODS-092	K2206977-009	10/10/2002	11.1	
SF-DODS-050	K2206977-010	10/10/2002	9.73	
SF-DODS-116	K2206977-011	10/10/2002	9.68	
SF-DODS-064	K2206977-012	10/10/2002	11.0	
SF-DODS-023	K2206977-013	10/10/2002	8.89	
SF-DODS-114	K2206977-014	10/10/2002	8.87	
SF-DODS-013	K2206977-015	10/10/2002	4.79	

Approved By: _____ Date: 11/6/02

Total Solids/060595

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/21-27/02
Date Received: 10/1/2002

Duplicate Summary
Solids, Total Volatile

Prep Method: NONE
Analysis Method: 160.4M
Test Notes:

Units: PERCENT
Basis: DRY

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
SF-DODS-016	K2206977-001	10/10/2002	6.00	6.24	6.12	4	
SF-DODS-050	K2206977-010	10/10/2002	9.73	10.3	10.0	6	

Approved By: _____ Date: 11/6/02

Total Solids/060595

Analytical Results

Client: Science Applications
Project: SF-DODS Sea Floor Mo/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
SF-DODS-016	K2206977-001	09/21/2002	10/01/2002	10/10/2002	46.4	
SF-DODS-017	K2206977-002	09/21/2002	10/01/2002	10/10/2002	55.4	
SF-DODS-019	K2206977-003	09/22/2002	10/01/2002	10/10/2002	37.6	
SF-DODS-020	K2206977-004	09/22/2002	10/01/2002	10/10/2002	33.1	
SF-DODS-010	K2206977-005	09/22/2002	10/01/2002	10/10/2002	41.8	
SF-DODS-006	K2206977-006	09/22/2002	10/01/2002	10/10/2002	35.1	
SF-DODS-027	K2206977-007	09/23/2002	10/01/2002	10/10/2002	38.4	
SF-DODS-057	K2206977-008	09/23/2002	10/01/2002	10/10/2002	42.9	
SF-DODS-092	K2206977-009	09/24/2002	10/01/2002	10/10/2002	28.0	
SF-DODS-050	K2206977-010	09/24/2002	10/01/2002	10/10/2002	32.9	
SF-DODS-116	K2206977-011	09/25/2002	10/01/2002	10/10/2002	32.7	
SF-DODS-064	K2206977-012	09/25/2002	10/01/2002	10/10/2002	30.5	
SF-DODS-023	K2206977-013	09/26/2002	10/01/2002	10/10/2002	37.2	
SF-DODS-114	K2206977-014	09/27/2002	10/01/2002	10/10/2002	35.5	
SF-DODS-013	K2206977-015	09/27/2002	10/01/2002	10/10/2002	52.6	

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Mo/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Analyzed:	10/11/2002

Duplicate Sample Summary

Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	WET
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
SF-DODS-016	K2206977-001	46.4	46.3	46.4	<1	

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Mo/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Analyzed:	10/11/2002

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	WET
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
SF-DODS-050	K2206977-010	32.9	33.5	33.2	2	

Analytical Results

Client: Science Applications
Project: SF-DODS Sea Floor Mo/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
SF-DODS-013 Dup	K2206977-017	09/27/2002	10/01/2002	10/24/2002	54.9	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/21-27/02
Date Received: 10/01/02

Carbon, Total Organic

Prep Method: NONE
Analysis Method: ASTM D4129-82M
Test Notes:

Units: PERCENT
Basis: Dry

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SF-DODS-016	K2206977-001	0.05	0.02	1	NA	10/12/02	1.70	
SF-DODS-017	K2206977-002	0.05	0.02	1	NA	10/12/02	1.09	
SF-DODS-019	K2206977-003	0.05	0.02	1	NA	10/12/02	2.60	
SF-DODS-020	K2206977-004	0.05	0.02	1	NA	10/12/02	2.83	
SF-DODS-010	K2206977-005	0.05	0.02	1	NA	10/12/02	1.67	
SF-DODS-006	K2206977-006	0.05	0.02	1	NA	10/12/02	2.44	
SF-DODS-027	K2206977-007	0.05	0.02	1	NA	10/12/02	2.24	
SF-DODS-057	K2206977-008	0.05	0.02	1	NA	10/12/02	1.82	
SF-DODS-092	K2206977-009	0.05	0.02	1	NA	10/12/02	3.08	
SF-DODS-050	K2206977-010	0.05	0.02	1	NA	10/12/02	2.91	
SF-DODS-116	K2206977-011	0.05	0.02	1	NA	10/12/02	3.04	
SF-DODS-064	K2206977-012	0.05	0.02	1	NA	10/12/02	3.09	
SF-DODS-023	K2206977-013	0.05	0.02	1	NA	10/12/02	2.57	
SF-DODS-114	K2206977-014	0.05	0.02	1	NA	10/12/02	2.63	
SF-DODS-013	K2206977-015	0.05	0.02	1	NA	10/12/02	0.90	
SF-DODS-013 Dup	K2206977-017	0.05	0.02	1	NA	10/15/02	0.89	
Method Blank	K2206977-MB	0.05	0.02	1	NA	10/12/02	0.02	U
Method Blank	K2206977-MB	0.05	0.02	1	NA	10/15/02	0.02	U

M Modified

Approved By: _____ Date: 11/9/02

1A/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/21/02
Date Received: 10/01/02
Date Extracted: NA
Date Analyzed: 10/12/02

Duplicate Summary
Carbon, Total Organic

Sample Name: SF-DODS-016
Lab Code: K2206977-001DUP
Test Notes:

Units: PERCENT
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Carbon, Total Organic	NONE	ASTM D4129-82M	0.05	1.70	1.72	1.71	1	

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.
M Modified

Approved By: _____ Date: 11/9/02

DUP/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/02
Sample Matrix:	Sediment	**Date Received:**	10/01/02
		Date Extracted:	NA
		Date Analyzed:	10/12/02

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	SF-DODS-016	Units:	PERCENT
Lab Code:	K2206977-001MS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	NONE	ASTM D4129-82M	0.05	5.21	1.70	6.76	97	75-125	

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.

M Modified

Approved By: _____ Date: 11/9/02

MS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/02
Sample Matrix:	Sediment	**Date Received:**	10/01/02
		Date Extracted:	NA
		Date Analyzed:	10/12/02

Matrix Spike/Duplicate Matrix Spike Summary
Carbon, Total Organic

Sample Name:	SF-DODS-016	Units:	PERCENT
Lab Code:	K2206977-001MS, K2206977-001DMS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Carbon, Total Organic	NONE	ASTM D4129-82M	0.05	5.21	6.69	1.70	6.76	8.08	97	95	75-125	2	

Approved By: _____ Date: 11/9/02

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
LCS Matrix: Sediment

Service Request: K2206977
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 10/12.15/02

Laboratory Control Sample Summary
Carbon, Total Organic

Sample Name: Lab Control Sample
Lab Code: K2206977-LCS
Test Notes:

Units: PERCENT
Basis: Dry

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	NONE	ASTM D4129-82M	0.57	0.65	114	85-115	
Carbon, Total Organic	NONE	ASTM D4129-82M	0.57	0.63	111	85-115	

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.
M Modified

Approved By: _____ Date: 11/9/02

LCS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS

Service Request: K2206977
Date Collected: NA
Date Received: NA
Date Analyzed: 10/12,15/02

Carbon, Total Organic
ASTM D4129-82M
Units: PERCENT
Dry Weight Basis

CONTINUING CALIBRATION VERIFICATION (CCV)

	True Value	Measured Value	Percent Recovery
CCV 1 Result	20.0	19.6	98
CCV 2 Result	20.0	20.1	100
CCV 3 Result	20.0	20.2	101
CCV 4 Result	20.0	19.0	95
CCV 5 Result	20.0	18.0	90

CONTINUING CALIBRATION BLANK (CCB)

	MRL	Blank Value
CCB 1 Result	0.05	0.02U
CCB 2 Result	0.05	0.02U
CCB 3 Result	0.05	0.02U
CCB 4 Result	0.05	0.02U
CCB 5 Result	0.05	0.02U

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.

Approved By: _____ Date: 11/8/02

COMBOQCD/042695

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/21-27/02
Date Received: 10/01/02

Sulfide

Prep Method: NONE
Analysis Method: 9030M
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SF-DODS-016	K2206977-001	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-017	K2206977-002	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-019	K2206977-003	2	0.9	1	NA	10/11/02	4	
SF-DODS-020	K2206977-004	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-010	K2206977-005	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-006	K2206977-006	2	0.9	1	NA	10/11/02	12	
SF-DODS-027	K2206977-007	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-057	K2206977-008	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-092	K2206977-009	2	0.9	1	NA	10/11/02	5	
SF-DODS-050	K2206977-010	2	0.9	1	NA	10/11/02	41	
SF-DODS-116	K2206977-011	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-064	K2206977-012	2	0.9	1	NA	10/11/02	5	
SF-DODS-023	K2206977-013	2	0.9	1	NA	10/11/02	16	
SF-DODS-114	K2206977-014	2	0.9	1	NA	10/11/02	0.9	U
SF-DODS-013	K2206977-015	2	0.9	1	NA	10/11/02	13	
SF-DODS-013 Dup	K2206977-017	2	0.9	1	NA	10/15/02	3	
Method Blank	K2206977-MB	2	0.9	1	NA	10/11/02	0.9	U
Method Blank	K2206977-MB	2	0.9	1	NA	10/15/02	0.9	U

M Modified for analysis of soil.

Approved By: _____ Date: 11/9/02

1A/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/27/02
Date Received: 10/01/02
Date Extracted: NA
Date Analyzed: 10/15/02

Duplicate Summary
Inorganic Parameters

Sample Name: SF-DODS-013 Dup
Lab Code: K2206977-017DUP
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Sulfide	NONE	9030M	2	3	6	5	67	*

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.

Approved By: _____ Date: 11/9/02

DUP/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/02
Sample Matrix:	Sediment	**Date Received:**	10/01/02
		Date Extracted:	NA
		Date Analyzed:	10/15/02

Matrix Spike Summary
Inorganic Parameters

Sample Name:	SF-DODS-013 Dup	Units:	mg/Kg (ppm)
Lab Code:	K2206977-017MS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Sulfide	NONE	9030M	2	618	3	561	90	60-130	

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.

Approved By: _____ Date: 11/9/02

MS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/02
Sample Matrix:	Sediment	**Date Received:**	10/01/02
		Date Extracted:	NA
		Date Analyzed:	10/15/02

Matrix Spike/Duplicate Matrix Spike Summary
Inorganic Parameters

Sample Name:	SF-DODS-013 Dup	Units:	mg/Kg (ppm)
Lab Code:	K2206977-017MS, K2206977-017DMS	Basis:	Dry
Test Notes:			

				Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent	
Analyte	**Prep Method**	**Analysis Method**	**MRL**	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**	**Result Notes**
Sulfide	NONE	9030M	2	618	663	3	561	661	90	99	60-130	10	

Approved By: _____ Date: 11/9/02

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	10/11.15/02

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name:	Lab Control Sample	Units:	mg/L (ppm)
Lab Code:	K2206977-LCS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Sulfide	NONE	9030M	1.4	1.4	101	60-130	
Sulfide	NONE	9030M	1.4	1.3	97	60-130	

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.

Approved By: _____ Date: 11/5/02

LCS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
		Date Received:	NA
		Date Analyzed:	10/11,15/02

Sulfide
EPA Method 9030M
Units: mg/L (ppm)

CONTINUING CALIBRATION VERIFICATION (CCV)

	True Value	Measured Value	Percent Recovery
CCV 1 Result	1.4	1.4	99
CCV 2 Result	1.4	1.4	99
CCV 3 Result	1.4	1.4	99
CCV 1 Result	1.4	1.4	100
CCV 2 Result	1.4	1.4	100

CONTINUING CALIBRATION BLANK (CCB)

	MRL	Blank Value
CCB 1 Result	0.1	0.05 U
CCB 2 Result	0.1	0.05 U
CCB 3 Result	0.1	0.05 U
CCB 1 Result	0.1	0.05 U
CCB 2 Result	0.1	0.05 U

Percent recoveries and relative percent differences (RPD) are determined using values which have not been rounded.

Approved By: _____ Date: 11/5/02

COMBOQCD/042695

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/21/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-016
Lab Code: K2206977-001

Sand Fraction: Weight (Grams)	15.5509
Sand Fraction: Weight Recovered (Grams)	15.1493
Sand Fraction: Percent Recovery	97.4

Weight as received (Grams)	86.9221
Percent Solids	46.2
Weight Oven-Dried (Grams)	40.1580

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0267	0.07
Sand, Very Coarse	0.850 mm	20	0.2105	0.52
Sand, Coarse	0.425 mm	40	0.5880	1.46
Sand, Medium	0.250 mm	60	6.3835	15.9
Sand, Fine	0.106 mm	140	6.5343	16.3
Sand, Very Fine	0.075 mm	200	1.1389	2.84
Clay			9.7200	24.2
Silt			15.6350	38.9
		Total	40.2369	100

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/21/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-017
Lab Code: K2206977-002

Sand Fraction: Weight (Grams)	27.5961
Sand Fraction: Weight Recovered (Grams)	27.4597
Sand Fraction: Percent Recovery	99.5

Weight as received (Grams)	82.9625
Percent Solids	53.9
Weight Oven-Dried (Grams)	44.7168

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0134	0.03
Sand, Very Coarse	0.850 mm	20	0.4002	0.89
Sand, Coarse	0.425 mm	40	2.2414	5.01
Sand, Medium	0.250 mm	60	12.5351	28.0
Sand, Fine	0.106 mm	140	11.8395	26.5
Sand, Very Fine	0.075 mm	200	0.3483	0.78
Clay			8.4400	18.9
Silt			9.2250	20.6
		Total	45.0429	101

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/22/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-019
Lab Code: K2206977-003

Sand Fraction: Weight (Grams)	7.7513
Sand Fraction: Weight Recovered (Grams)	7.7043
Sand Fraction: Percent Recovery	99.4

Weight as received (Grams)	81.3838
Percent Solids	37.6
Weight Oven-Dried (Grams)	30.6003

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0089	0.03
Sand, Very Coarse	0.850 mm	20	0.0407	0.13
Sand, Coarse	0.425 mm	40	0.3071	1.00
Sand, Medium	0.250 mm	60	2.9228	9.55
Sand, Fine	0.106 mm	140	4.2425	13.9
Sand, Very Fine	0.075 mm	200	0.1533	0.50
Clay			7.7950	25.5
Silt			15.7600	51.5
		Total	31.2303	102

Approved By: M J Fitt Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/22/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-020
Lab Code: K2206977-004

Sand Fraction: Weight (Grams)	3.5124
Sand Fraction: Weight Recovered (Grams)	3.4673
Sand Fraction: Percent Recovery	98.7

Weight as received (Grams)	78.4442
Percent Solids	33.2
Weight Oven-Dried (Grams)	26.0435

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0000	0.00
Sand, Very Coarse	0.850 mm	20	0.0233	0.09
Sand, Coarse	0.425 mm	40	0.1091	0.42
Sand, Medium	0.250 mm	60	1.1020	4.23
Sand, Fine	0.106 mm	140	2.1123	8.11
Sand, Very Fine	0.075 mm	200	0.1053	0.40
Clay			7.7400	29.7
Silt			14.7900	56.8
		Total	25.9820	99.8

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/22/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-010
Lab Code: K2206977-005

Sand Fraction: Weight (Grams)	11.0156
Sand Fraction: Weight Recovered (Grams)	10.9420
Sand Fraction: Percent Recovery	99.3

Weight as received (Grams)	77.1699
Percent Solids	43.0
Weight Oven-Dried (Grams)	33.1831

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0351	0.11
Sand, Very Coarse	0.850 mm	20	0.0759	0.23
Sand, Coarse	0.425 mm	40	0.5638	1.70
Sand, Medium	0.250 mm	60	4.2134	12.7
Sand, Fine	0.106 mm	140	5.7121	17.2
Sand, Very Fine	0.075 mm	200	0.3100	0.93
Clay			10.1850	30.7
Silt			12.2500	36.9
		Total	33.3453	100

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/22/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-006
Lab Code: K2206977-006

Sand Fraction: Weight (Grams)	4.7247
Sand Fraction: Weight Recovered (Grams)	4.6885
Sand Fraction: Percent Recovery	99.2

Weight as received (Grams)	60.7951
Percent Solids	34.4
Weight Oven-Dried (Grams)	20.9135

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0036	0.02
Sand, Very Coarse	0.850 mm	20	0.0523	0.25
Sand, Coarse	0.425 mm	40	0.3455	1.65
Sand, Medium	0.250 mm	60	1.7009	8.13
Sand, Fine	0.106 mm	140	2.4412	11.7
Sand, Very Fine	0.075 mm	200	0.1283	0.61
Clay			7.4000	35.4
Silt			9.1700	43.8
		Total	21.2418	102

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/23/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-027
Lab Code: K2206977-007

Sand Fraction: Weight (Grams)	7.3239
Sand Fraction: Weight Recovered (Grams)	7.2576
Sand Fraction: Percent Recovery	99.1

Weight as received (Grams)	79.3676
Percent Solids	38.6
Weight Oven-Dried (Grams)	30.6359

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0083	0.03
Sand, Very Coarse	0.850 mm	20	0.0827	0.27
Sand, Coarse	0.425 mm	40	0.3332	1.09
Sand, Medium	0.250 mm	60	2.3176	7.56
Sand, Fine	0.106 mm	140	4.2180	13.8
Sand, Very Fine	0.075 mm	200	0.2660	0.87
Clay			8.5750	28.0
Silt			15.1150	49.3
		Total	30.9158	101

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/23/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-057
Lab Code: K2206977-008

Sand Fraction: Weight (Grams)	7.1761
Sand Fraction: Weight Recovered (Grams)	7.1280
Sand Fraction: Percent Recovery	99.3

Weight as received (Grams)	59.9208
Percent Solids	43.1
Weight Oven-Dried (Grams)	25.8259

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0135	0.05
Sand, Very Coarse	0.850 mm	20	0.1980	0.77
Sand, Coarse	0.425 mm	40	0.2386	0.92
Sand, Medium	0.250 mm	60	0.6411	2.48
Sand, Fine	0.106 mm	140	3.0058	11.6
Sand, Very Fine	0.075 mm	200	2.6280	10.2
Clay			8.7050	33.7
Silt			10.3950	40.3
		Total	25.8250	100

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/24/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-092
Lab Code: K2206977-009

Sand Fraction: Weight (Grams)	0.8729
Sand Fraction: Weight Recovered (Grams)	0.8419
Sand Fraction: Percent Recovery	96.4

Weight as received (Grams)	60.6738
Percent Solids	28.0
Weight Oven-Dried (Grams)	16.9887

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0000	0.00
Sand, Very Coarse	0.850 mm	20	0.0308	0.18
Sand, Coarse	0.425 mm	40	0.0810	0.48
Sand, Medium	0.250 mm	60	0.1462	0.86
Sand, Fine	0.106 mm	140	0.4588	2.70
Sand, Very Fine	0.075 mm	200	0.0902	0.53
Clay			6.4600	38.0
Silt			9.9200	58.4
		Total	17.1870	101

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/24/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-050
Lab Code: K2206977-010

Sand Fraction: Weight (Grams)	1.1224
Sand Fraction: Weight Recovered (Grams)	1.0863
Sand Fraction: Percent Recovery	96.8

Weight as received (Grams)	62.4306
Percent Solids	32.8
Weight Oven-Dried (Grams)	20.4772

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0000	0.00
Sand, Very Coarse	0.850 mm	20	0.0396	0.19
Sand, Coarse	0.425 mm	40	0.1078	0.53
Sand, Medium	0.250 mm	60	0.1248	0.61
Sand, Fine	0.106 mm	140	0.3658	1.79
Sand, Very Fine	0.075 mm	200	0.3329	1.63
Clay			6.4550	31.5
Silt			12.9450	63.2
		Total	20.3709	99.5

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/25/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-116
Lab Code: K2206977-011

Sand Fraction: Weight (Grams)	1.3641
Sand Fraction: Weight Recovered (Grams)	1.3288
Sand Fraction: Percent Recovery	97.4

Weight as received (Grams)	62.2932
Percent Solids	31.3
Weight Oven-Dried (Grams)	19.4978

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0000	0.00
Sand, Very Coarse	0.850 mm	20	0.0248	0.13
Sand, Coarse	0.425 mm	40	0.0786	0.40
Sand, Medium	0.250 mm	60	0.2005	1.03
Sand, Fine	0.106 mm	140	0.7243	3.71
Sand, Very Fine	0.075 mm	200	0.2134	1.09
Clay			7.0800	36.3
Silt			11.7550	60.3
		Total	20.0766	103

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	9/25/02
Sample Matrix:	Sediment	**Date Received:**	10/1/02
		Date Analyzed:	10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-064
Lab Code: K2206977-012

Sand Fraction: Weight (Grams)	0.8846
Sand Fraction: Weight Recovered (Grams)	0.7700
Sand Fraction: Percent Recovery	87.0

Weight as received (Grams)	62.6478
Percent Solids	29.1
Weight Oven-Dried (Grams)	18.2305

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0123	0.07
Sand, Very Coarse	0.850 mm	20	0.1716	0.94
Sand, Coarse	0.425 mm	40	0.1767	0.97
Sand, Medium	0.250 mm	60	0.1596	0.88
Sand, Fine	0.106 mm	140	0.2160	1.18
Sand, Very Fine	0.075 mm	200	0.0240	0.13
Clay			7.0250	38.5
Silt			10.5750	58.0
		Total	18.3602	101

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/25/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-023
Lab Code: K2206977-013DUP

Sand Fraction: Weight (Grams)	3.5869
Sand Fraction: Weight Recovered (Grams)	3.4596
Sand Fraction: Percent Recovery	96.5

Weight as received (Grams)	61.2637
Percent Solids	36.6
Weight Oven-Dried (Grams)	22.4225

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0043	0.02
Sand, Very Coarse	0.850 mm	20	0.0555	0.25
Sand, Coarse	0.425 mm	40	0.1955	0.87
Sand, Medium	0.250 mm	60	1.2019	5.36
Sand, Fine	0.106 mm	140	1.7111	7.63
Sand, Very Fine	0.075 mm	200	0.2575	1.15
Clay			8.2500	36.8
Silt			11.0700	49.4
		Total	22.7458	101

Approved By: _____ Date: 11/5/02

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 9/26/02
Date Received: 10/1/02
Date Analyzed: 10/31/02

Particle Size Determination
ASTM Method D422 Modified

Sample Name: SF-DODS-023
Lab Code: K2206977-013

Sand Fraction: Weight (Grams)	4.0978
Sand Fraction: Weight Recovered (Grams)	3.9194
Sand Fraction: Percent Recovery	95.6

Weight as received (Grams)	66.7072
Percent Solids	36.6
Weight Oven-Dried (Grams)	24.4148

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0000	0.00
Sand, Very Coarse	0.850 mm	20	0.0915	0.37
Sand, Coarse	0.425 mm	40	0.2480	1.02
Sand, Medium	0.250 mm	60	1.4221	5.82
Sand, Fine	0.106 mm	140	1.8499	7.58
Sand, Very Fine	0.075 mm	200	0.2716	1.11
Clay			8.2300	33.7
Silt			12.5100	51.2
		Total	24.6231	101

Approved By: _____ Date: 11/5/02

METALS
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INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/21/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-016
Lab Code: K2206977-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.5	0.1	5	10/14/02	10/22/02	2.8		
Cadmium	200.8	0.05	0.02	5	10/14/02	10/22/02	0.27		
Chromium	200.8	0.20	0.03	5	10/14/02	10/22/02	40.8		
Copper	200.8	0.10	0.04	5	10/14/02	10/22/02	25.6		
Lead	200.8	0.05	0.03	5	10/14/02	10/22/02	5.43		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.08		
Nickel	200.8	0.20	0.02	5	10/14/02	10/22/02	48.6		
Selenium	200.8	1.0	0.2	5	10/14/02	10/22/02	2.3		
Silver	200.8	0.020	0.002	5	10/14/02	10/23/02	0.425		
Zinc	200.8	0.5	0.1	5	10/14/02	10/22/02	63.2		

% Solids: 46.4

Comments:

METALS

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INORGANIC ANALYSIS DATA SHEET

Client:	Science Applications	Service Request:	K2206977
Project No.:	SF-DODS	Date Collected:	09/21/02
Project Name:	SF-DODS Sea Floor Monitoring	Date Received:	10/01/02
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SF-DODS-017 Lab Code: K2206977-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.4	0.1	5	10/14/02	10/22/02	2.4		
Cadmium	200.8	0.04	0.02	5	10/14/02	10/22/02	0.12		
Chromium	200.8	0.16	0.02	5	10/14/02	10/22/02	31.6		
Copper	200.8	0.08	0.03	5	10/14/02	10/22/02	17.8		
Lead	200.8	0.04	0.02	5	10/14/02	10/22/02	6.33		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.07		
Nickel	200.8	0.16	0.02	5	10/14/02	10/22/02	37.8		
Selenium	200.8	0.8	0.2	5	10/14/02	10/22/02	1.2		
Silver	200.8	0.016	0.002	5	10/14/02	10/23/02	0.222		
Zinc	200.8	0.4	0.1	5	10/14/02	10/22/02	42.1		

% Solids: 55.4

Comments:

METALS

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INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/22/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-019
Lab Code: K2206977-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.6	0.1	5	10/14/02	10/22/02	3.2		
Cadmium	200.8	0.06	0.02	5	10/14/02	10/22/02	0.23		
Chromium	200.8	0.24	0.04	5	10/14/02	10/22/02	42.4		
Copper	200.8	0.12	0.05	5	10/14/02	10/22/02	37.0		
Lead	200.8	0.06	0.04	5	10/14/02	10/22/02	6.46		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.11		
Nickel	200.8	0.24	0.02	5	10/14/02	10/22/02	55.6		
Selenium	200.8	1.2	0.2	5	10/14/02	10/22/02	3.1		
Silver	200.8	0.024	0.002	5	10/14/02	10/23/02	0.510		
Zinc	200.8	0.6	0.1	5	10/14/02	10/22/02	75.2		

% Solids: 37.6

Comments:

METALS

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INORGANIC ANALYSIS DATA SHEET

Client:	Science Applications	Service Request:	K2206977
Project No.:	SF-DODS	Date Collected:	09/22/02
Project Name:	SF-DODS Sea Floor Monitoring	Date Received:	10/01/02
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SF-DODS-020 Lab Code: K2206977-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.7	0.1	5	10/14/02	10/22/02	3.4		
Cadmium	200.8	0.07	0.03	5	10/14/02	10/22/02	0.27		
Chromium	200.8	0.27	0.04	5	10/14/02	10/22/02	45.5		
Copper	200.8	0.14	0.05	5	10/14/02	10/22/02	44.3		
Lead	200.8	0.07	0.04	5	10/14/02	10/22/02	6.88		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.12		
Nickel	200.8	0.27	0.03	5	10/14/02	10/22/02	61.0		
Selenium	200.8	1.4	0.3	5	10/14/02	10/22/02	4.0		
Silver	200.8	0.028	0.003	5	10/14/02	10/23/02	0.594		
Zinc	200.8	0.7	0.1	5	10/14/02	10/22/02	85.3		

% Solids: 33.1

Comments:

METALS

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INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/22/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-010
Lab Code: K2206977-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.5	0.1	5	10/14/02	10/22/02	2.9		
Cadmium	200.8	0.05	0.02	5	10/14/02	10/22/02	0.20		
Chromium	200.8	0.22	0.03	5	10/14/02	10/22/02	40.0		
Copper	200.8	0.11	0.04	5	10/14/02	10/22/02	30.5		
Lead	200.8	0.05	0.03	5	10/14/02	10/22/02	6.45		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.09		
Nickel	200.8	0.22	0.02	5	10/14/02	10/22/02	51.6		
Selenium	200.8	1.1	0.2	5	10/14/02	10/22/02	2.3		
Silver	200.8	0.022	0.002	5	10/14/02	10/23/02	0.407		
Zinc	200.8	0.5	0.1	5	10/14/02	10/22/02	68.7		

% Solids: 41.8

Comments:

METALS

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INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/22/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-006
Lab Code: K2206977-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.6	0.1	5	10/14/02	10/22/02	3.2		
Cadmium	200.8	0.06	0.03	5	10/14/02	10/22/02	0.27		
Chromium	200.8	0.26	0.04	5	10/14/02	10/22/02	47.2		
Copper	200.8	0.13	0.05	5	10/14/02	10/22/02	34.5		
Lead	200.8	0.06	0.04	5	10/14/02	10/22/02	7.45		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.11		
Nickel	200.8	0.26	0.03	5	10/14/02	10/22/02	59.0		
Selenium	200.8	1.3	0.3	5	10/14/02	10/22/02	3.3		
Silver	200.8	0.026	0.003	5	10/14/02	10/23/02	0.488		
Zinc	200.8	0.6	0.1	5	10/14/02	10/22/02	78.1		

% Solids: 35.1

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/23/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-027
Lab Code: K2206977-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.6	0.1	5	10/14/02	10/22/02	3.0		
Cadmium	200.8	0.06	0.02	5	10/14/02	10/22/02	0.24		
Chromium	200.8	0.24	0.04	5	10/14/02	10/22/02	42.0		
Copper	200.8	0.12	0.05	5	10/14/02	10/22/02	34.5		
Lead	200.8	0.06	0.04	5	10/14/02	10/22/02	7.40		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.10		
Nickel	200.8	0.24	0.02	5	10/14/02	10/22/02	56.1		
Selenium	200.8	1.2	0.2	5	10/14/02	10/22/02	3.0		
Silver	200.8	0.024	0.002	5	10/14/02	10/23/02	0.452		
Zinc	200.8	0.6	0.1	5	10/14/02	10/22/02	78.1		

% Solids: 38.4

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/23/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-057
Lab Code: K2206977-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.5	0.1	5	10/14/02	10/22/02	2.8		
Cadmium	200.8	0.05	0.02	5	10/14/02	10/22/02	0.32		
Chromium	200.8	0.21	0.03	5	10/14/02	10/22/02	44.5		
Copper	200.8	0.11	0.04	5	10/14/02	10/22/02	29.4		
Lead	200.8	0.05	0.03	5	10/14/02	10/22/02	6.92		
Mercury	7471A	0.01	0.01	1	10/18/02	10/18/02	0.08		
Nickel	200.8	0.21	0.02	5	10/14/02	10/22/02	57.7		
Selenium	200.8	1.1	0.2	5	10/14/02	10/22/02	2.4		
Silver	200.8	0.021	0.002	5	10/14/02	10/23/02	0.452		
Zinc	200.8	0.5	0.1	5	10/14/02	10/22/02	80.0		

% Solids: 42.9

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/24/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-092
Lab Code: K2206977-009

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.8	0.2	5	10/14/02	10/22/02	3.9		
Cadmium	200.8	0.08	0.03	5	10/14/02	10/22/02	0.29		
Chromium	200.8	0.33	0.05	5	10/14/02	10/22/02	55.5		
Copper	200.8	0.16	0.06	5	10/14/02	10/22/02	44.4		
Lead	200.8	0.08	0.05	5	10/14/02	10/22/02	8.01		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.12		
Nickel	200.8	0.33	0.03	5	10/14/02	10/22/02	68.3		
Selenium	200.8	1.6	0.3	5	10/14/02	10/22/02	3.7		
Silver	200.8	0.033	0.003	5	10/14/02	10/23/02	0.574		
Zinc	200.8	0.8	0.2	5	10/14/02	10/22/02	98.7		

% Solids: 28.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/24/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-050
Lab Code: K2206977-010

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.7	0.1	5	10/14/02	10/22/02	3.2		
Cadmium	200.8	0.07	0.03	5	10/14/02	10/22/02	0.43		
Chromium	200.8	0.28	0.04	5	10/14/02	10/22/02	55.3		
Copper	200.8	0.14	0.06	5	10/14/02	10/22/02	30.2		
Lead	200.8	0.07	0.04	5	10/14/02	10/22/02	7.69		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.10		
Nickel	200.8	0.28	0.03	5	10/14/02	10/22/02	64.1		
Selenium	200.8	1.4	0.3	5	10/14/02	10/22/02	3.0		
Silver	200.8	0.027	0.003	5	10/14/02	10/23/02	0.609		
Zinc	200.8	0.7	0.1	5	10/14/02	10/22/02	85.3		

% Solids: 32.9

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/25/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-116
Lab Code: K2206977-011

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.7	0.1	5	10/14/02	10/22/02	3.7		
Cadmium	200.8	0.07	0.03	5	10/14/02	10/22/02	0.32		
Chromium	200.8	0.28	0.04	5	10/14/02	10/22/02	55.6		
Copper	200.8	0.14	0.06	5	10/14/02	10/22/02	43.0		
Lead	200.8	0.07	0.04	5	10/14/02	10/22/02	11.3		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.12		
Nickel	200.8	0.28	0.03	5	10/14/02	10/22/02	67.3		
Selenium	200.8	1.4	0.3	5	10/14/02	10/22/02	3.3		
Silver	200.8	0.028	0.003	5	10/14/02	10/23/02	0.551		
Zinc	200.8	0.7	0.1	5	10/14/02	10/22/02	98.9		

% Solids: 32.7

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Science Applications	Service Request:	K2206977
Project No.:	SF-DODS	Date Collected:	09/25/02
Project Name:	SF-DODS Sea Floor Monitoring	Date Received:	10/01/02
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SF-DODS-064 Lab Code: K2206977-012

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.8	0.2	5	10/14/02	10/22/02	3.4		
Cadmium	200.8	0.08	0.03	5	10/14/02	10/22/02	0.29		
Chromium	200.8	0.30	0.05	5	10/14/02	10/22/02	58.1		
Copper	200.8	0.15	0.06	5	10/14/02	10/22/02	52.1		
Lead	200.8	0.08	0.05	5	10/14/02	10/22/02	8.35		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.12		
Nickel	200.8	0.30	0.03	5	10/14/02	10/22/02	70.4		
Selenium	200.8	1.5	0.3	5	10/14/02	10/22/02	3.8		
Silver	200.8	0.030	0.003	5	10/14/02	10/23/02	0.504		
Zinc	200.8	0.8	0.2	5	10/14/02	10/22/02	104		

% Solids: 30.5

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/26/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-023
Lab Code: K2206977-013

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.6	0.1	5	10/14/02	10/22/02	3.1		
Cadmium	200.8	0.06	0.02	5	10/14/02	10/22/02	0.25		
Chromium	200.8	0.24	0.04	5	10/14/02	10/22/02	49.8		
Copper	200.8	0.12	0.05	5	10/14/02	10/22/02	37.9		
Lead	200.8	0.06	0.04	5	10/14/02	10/22/02	6.84		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.11		
Nickel	200.8	0.24	0.02	5	10/14/02	10/22/02	61.0		
Selenium	200.8	1.2	0.2	5	10/14/02	10/22/02	2.7		
Silver	200.8	0.024	0.002	5	10/14/02	10/23/02	0.497		
Zinc	200.8	0.6	0.1	5	10/14/02	10/22/02	84.0		

% Solids: 37.2

Comments:

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/27/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-114
Lab Code: K2206977-014

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.6	0.1	5	10/14/02	10/22/02	3.0		
Cadmium	200.8	0.06	0.03	5	10/14/02	10/22/02	0.53		
Chromium	200.8	0.26	0.04	5	10/14/02	10/22/02	53.2		
Copper	200.8	0.13	0.05	5	10/14/02	10/22/02	36.6		
Lead	200.8	0.06	0.04	5	10/14/02	10/22/02	21.3		
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.09		
Nickel	200.8	0.26	0.03	5	10/14/02	10/22/02	65.4		
Selenium	200.8	1.3	0.3	5	10/14/02	10/22/02	3.8		
Silver	200.8	0.026	0.003	5	10/14/02	10/23/02	0.783		
Zinc	200.8	3.2	0.6	25	10/14/02	10/22/02	135		

% Solids: 35.5

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/27/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-013
Lab Code: K2206977-015

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.4	0.1	5	10/14/02	10/22/02	5.7		
Cadmium	200.8	0.04	0.02	5	10/14/02	10/22/02	0.19		
Chromium	200.8	0.17	0.03	5	10/14/02	10/22/02	45.5		
Copper	200.8	0.09	0.03	5	10/14/02	10/22/02	26.0		
Lead	200.8	0.04	0.03	5	10/14/02	10/22/02	17.0		
Mercury	7471A	0.01	0.01	1	10/18/02	10/18/02	0.16		
Nickel	200.8	0.17	0.02	5	10/14/02	10/22/02	52.5		
Selenium	200.8	0.9	0.2	5	10/14/02	10/22/02	0.3	B	
Silver	200.8	0.017	0.002	5	10/14/02	10/23/02	0.234		
Zinc	200.8	0.4	0.1	5	10/14/02	10/22/02	68.4		

% Solids: 52.6

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SEDIMENT

Service Request: K2206977
Date Collected: 09/27/02
Date Received: 10/01/02
Units: MG/KG
Basis: Dry

Sample Name: SF-DODS-013 Dup
Lab Code: K2206977-017

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.4	0.1	5	10/16/02	10/22/02	6.2		
Cadmium	200.8	0.04	0.02	5	10/16/02	10/22/02	0.20		
Chromium	200.8	0.83	0.12	25	10/16/02	10/22/02	66.4		
Copper	200.8	0.08	0.03	5	10/16/02	10/22/02	28.1		
Lead	200.8	0.04	0.02	5	10/16/02	10/22/02	16.9		
Mercury	7471A	0.01	0.01	1	10/18/02	10/18/02	0.14		
Nickel	200.8	0.17	0.02	5	10/16/02	10/22/02	53.2		
Selenium	200.8	0.8	0.2	5	10/16/02	10/22/02	0.2	U	
Silver	200.8	0.017	0.002	5	10/16/02	10/23/02	0.249		
Zinc	200.8	2.1	0.4	25	10/16/02	10/22/02	82.5		

% Solids: 54.9

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Service Request: K2206977

Project No.: SF-DODS
Date Collected:

Project Name: SF-DODS Sea Floor Monitoring
Date Received:

Matrix: SOIL
Units: MG/KG

Basis: Dry

Sample Name: Method Blank
Lab Code: K2206977-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.5	0.1	5	10/14/02	10/22/02	0.1	U	
Cadmium	200.8	0.05	0.02	5	10/14/02	10/22/02	0.02	U	
Chromium	200.8	0.20	0.03	5	10/14/02	10/22/02	0.21		
Copper	200.8	0.10	0.04	5	10/14/02	10/22/02	0.04	U	
Lead	200.8	0.05	0.03	5	10/14/02	10/22/02	0.03	U	
Mercury	7471A	0.02	0.01	1	10/18/02	10/18/02	0.01	U	
Nickel	200.8	0.20	0.02	5	10/14/02	10/22/02	0.19	B	
Selenium	200.8	1.0	0.2	5	10/14/02	10/22/02	0.4	B	
Silver	200.8	0.020	0.002	5	10/14/02	10/23/02	0.002	U	
Zinc	200.8	0.5	0.1	5	10/14/02	10/22/02	0.4	B	

% Solids: 100.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Science Applications
Project No.: SF-DODS
Project Name: SF-DODS Sea Floor Monitoring
Matrix: SOIL

Service Request: K2206977
Date Collected:
Date Received:
Units: MG/KG
Basis: Dry

Sample Name: Method Blank2
Lab Code: K2206977-MB2

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	200.8	0.5	0.1	5	10/16/02	10/22/02	0.1	U	
Cadmium	200.8	0.05	0.02	5	10/16/02	10/22/02	0.02	U	
Chromium	200.8	0.20	0.03	5	10/16/02	10/22/02	0.23		
Copper	200.8	0.10	0.04	5	10/16/02	10/22/02	0.04	U	
Lead	200.8	0.05	0.03	5	10/16/02	10/22/02	0.03	U	
Nickel	200.8	0.20	0.02	5	10/16/02	10/22/02	0.20		
Selenium	200.8	1.0	0.2	5	10/16/02	10/22/02	0.2	U	
Silver	200.8	0.020	0.002	5	10/16/02	10/23/02	0.002	U	
Zinc	200.8	0.5	0.1	5	10/16/02	10/22/02	0.4	B	

% Solids: 100.0

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-016	**Units:**	mg/Kg
Lab Code:	K2206977-001	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F017.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.44 g		
% Solids:	46.4		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	**Diesel Range Organics (DRO)**	**24**	J	40	17	
CASID30160	Residual Range Organics (RRO)	17	U	100	17	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	64	41-151	10/09/02	Acceptable
n-Triacontane	81	63-147	10/09/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/21/2002
Date Received: 10/01/2002
Date Extracted: 10/04/2002
Date Analyzed: 10/09/2002

Diesel and Residual Range Organics

Sample Name: SF-DODS-017
Lab Code: K2206977-002
File ID: J:\GC21\DATA\100802\1008F018.D
Instrument ID: gc21

Units: mg/Kg
Basis: Dry
Level: Low

Extraction Method: EPA 3550B
Analysis Method: 8015M

Extraction Lot: KWG0207739
Calibration ID: CAL1840
Column1: RTX-1

Sample Amount: 5.41 g
% Solids: 55.4
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	15	U	34	15	
CASID30160	Residual Range Organics (RRO)	15	U	84	15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	65	41-151	10/09/02	Acceptable
n-Triacontane	81	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-019	**Units:**	mg/Kg
Lab Code:	K2206977-003	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F021.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.35 g		
% Solids:	37.6		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	**Diesel Range Organics (DRO)**	**21**	J	50	21	
CASID30160	Residual Range Organics (RRO)	21	U	130	21	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	41-151	10/09/02	Acceptable
n-Triacontane	87	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-020	**Units:**	mg/Kg
Lab Code:	K2206977-004	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F022.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.33 g		
% Solids:	33.1		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	24	U	57	24	
CASID30160	Residual Range Organics (RRO)	24	U	150	24	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	41-151	10/09/02	Acceptable
n-Triacontane	92	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-010	**Units:**	mg/Kg
Lab Code:	K2206977-005	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F023.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.31 g		
% Solids:	41.8		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	19	U	46	19	
CASID30160	Residual Range Organics (RRO)	19	U	120	19	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	66	41-151	10/09/02	Acceptable
n-Triacontane	84	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-006	**Units:**	mg/Kg
Lab Code:	K2206977-006	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F024.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.49 g		
% Solids:	35.1		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	22	U	52	22	
CASID30160	Residual Range Organics (RRO)	22	U	130	22	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	41-151	10/09/02	Acceptable
n-Triacontane	86	63-147	10/09/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/23/2002
Date Received: 10/01/2002
Date Extracted: 10/04/2002
Date Analyzed: 10/09/2002

Diesel and Residual Range Organics

Sample Name: SF-DODS-027
Lab Code: K2206977-007
File ID: J:\GC21\DATA\100802\1008F028.D
Instrument ID: gc21

Units: mg/Kg
Basis: Dry
Level: Low

Extraction Method: EPA 3550B
Analysis Method: 8015M

Extraction Lot: KWG0207739
Calibration ID: CAL1840
Column1: RTX-1

Sample Amount: 5.47 g
% Solids: 38.4
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	**Diesel Range Organics (DRO)**	21	J	48	20	
CASID30160	Residual Range Organics (RRO)	21	U	120	21	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	41-151	10/09/02	Acceptable
n-Triacontane	83	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-057	**Units:**	mg/Kg
Lab Code:	K2206977-008	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F029.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.44 g		
% Solids:	42.9		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	**Diesel Range Organics (DRO)**	**19**	J	43	18	
CASID30160	Residual Range Organics (RRO)	19	U	110	19	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	67	41-151	10/09/02	Acceptable
n-Triacontane	84	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-092	**Units:**	mg/Kg
Lab Code:	K2206977-009	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F030.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.49 g		
% Solids:	28.0		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	28	U	66	28	
CASID30160	Residual Range Organics (RRO)	28	U	170	28	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	41-151	10/09/02	Acceptable
n-Triacontane	90	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-050	**Units:**	mg/Kg
Lab Code:	K2206977-010	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F031.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.42 g		
% Solids:	32.9		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	24	U	57	24	
CASID30160	Residual Range Organics (RRO)	24	U	150	24	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	41-151	10/09/02	Acceptable
n-Triacontane	88	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-116	**Units:**	mg/Kg
Lab Code:	K2206977-011	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F032.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.11 g		
% Solids:	32.7		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	26	U	60	26	
CASID30160	Residual Range Organics (RRO)	26	U	150	26	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	74	41-151	10/09/02	Acceptable
n-Triacontane	91	63-147	10/09/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-064	**Units:**	mg/Kg
Lab Code:	K2206977-012	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F033 D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.35 g		
% Solids:	30.5		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	26	U	62	26	
CASID30160	Residual Range Organics (RRO)	26	U	160	26	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	41-151	10/09/02	Acceptable
n-Triacontane	93	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-023	**Units:**	mg/Kg
Lab Code:	K2206977-013	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F034.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.64 g		
% Solids:	37.2		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	20	U	48	20	
CASID30160	Residual Range Organics (RRO)	21	U	120	21	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	71	41-151	10/09/02	Acceptable
n-Triacontane	89	63-147	10/09/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-114	**Units:**	mg/Kg
Lab Code:	K2206977-014	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F035.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.09 g		
% Solids:	35.5		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	24	U	56	24	
CASID30160	Residual Range Organics (RRO)	24	U	140	24	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	71	41-151	10/09/02	Acceptable
n-Triacontane	88	63-147	10/09/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/09/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-013	**Units:**	mg/Kg
Lab Code:	K2206977-015	**Basis:**	Dry
File ID:	J:\GC21\DATA\100802\1008F036.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0207739
Analysis Method:	8015M	**Calibration ID:**	CAL1840
		Column1:	RTX-1
Sample Amount:	5.51 g		
% Solids:	52.6		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	15	U	35	15	
CASID30160	**Residual Range Organics (RRO)**	**16**	J	87	15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	41-151	10/09/02	Acceptable
n-Triacontane	86	63-147	10/09/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/16/2002
		Date Analyzed:	10/23/2002

Diesel and Residual Range Organics

Sample Name:	SF-DODS-013 Dup	**Units:**	mg/Kg
Lab Code:	K2206977-017	**Basis:**	Dry
File ID:	J:\GC21\DATA\102202\1022F105.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0208193
Analysis Method:	8015M	**Calibration ID:**	CAL2114
		Column1:	RTX-1
Sample Amount:	5.22 g		
% Solids:	54.9		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	15	U	35	15	
CASID30160	**Residual Range Organics (RRO)**	**38**	J	88	15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	41-151	10/23/02	Acceptable
n-Triacontane	96	63-147	10/23/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: NA
Date Received: NA
Date Extracted: 10/04/2002
Date Analyzed: 10/09/2002

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG0207739-4
File ID: J:\GC21\DATA\100802\1008F015.D
Instrument ID: gc21

Units: mg/Kg
Basis: Dry
Level: Low

Extraction Method: EPA 3550B
Analysis Method: 8015M

Extraction Lot: KWG0207739
Calibration ID: CAL1840
Column1: RTX-1

Sample Amount: 10.00 g
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	**Diesel Range Organics (DRO)**	4.7	J	10	4.2	
CASID30160	Residual Range Organics (RRO)	4.3	U	25	4.3	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	41-151	10/09/02	Acceptable
n-Triacontane	85	63-147	10/09/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	10/16/2002
		Date Analyzed:	10/23/2002

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0208193-4	**Basis:**	Dry
File ID:	J:\GC21\DATA 102202\1022F103.D	**Level:**	Low
Instrument ID:	gc21		
Extraction Method:	EPA 3550B	**Extraction Lot:**	KWG0208193
Analysis Method:	8015M	**Calibration ID:**	CAL2114
		Column1:	RTX-1
Sample Amount:	10.00 g		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
68334-30-5	Diesel Range Organics (DRO)	4.2	U	10	4.2	
CASID30160	**Residual Range Organics (RRO)**	**5.9**	**J**	25	4.3	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	77	41-151	10/23/02	Acceptable
n-Triacontane	103	63-147	10/23/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Water

Service Request: K2206977
Date Collected: 09/26/2002
Date Received: 10/01/2002

Organochlorine Pesticides

Sample Name: SF-DODS-RB
Lab Code: K2206977-016

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8081A

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.0099	0.0055	1	10/02/02	10/26/02	KWG0207657	
beta-BHC	ND	U	0.0099	0.0042	1	10/02/02	10/26/02	KWG0207657	
gamma-BHC (Lindane)	ND	U	0.0099	0.0042	1	10/02/02	10/26/02	KWG0207657	
delta-BHC	ND	U	0.0099	0.0050	1	10/02/02	10/26/02	KWG0207657	
Heptachlor	ND	U	0.0099	0.0049	1	10/02/02	10/26/02	KWG0207657	
Aldrin	ND	U	0.0099	0.0034	1	10/02/02	10/26/02	KWG0207657	
Heptachlor Epoxide	ND	U	0.0099	0.0084	1	10/02/02	10/26/02	KWG0207657	
gamma-Chlordane	ND	U	0.0099	0.0075	1	10/02/02	10/26/02	KWG0207657	
Endosulfan I	ND	U	0.0099	0.0055	1	10/02/02	10/26/02	KWG0207657	
alpha-Chlordane	ND	U	0.0099	0.0061	1	10/02/02	10/26/02	KWG0207657	
Dieldrin	ND	U	0.0099	0.0068	1	10/02/02	10/26/02	KWG0207657	
4,4'-DDE	ND	U	0.0099	0.0083	1	10/02/02	10/26/02	KWG0207657	
Endrin	ND	U	0.0099	0.0047	1	10/02/02	10/26/02	KWG0207657	
Endosulfan II	ND	U	0.0099	0.0059	1	10/02/02	10/26/02	KWG0207657	
4,4'-DDD	ND	U	0.0099	0.0052	1	10/02/02	10/26/02	KWG0207657	
Endrin Aldehyde	ND	U	0.0099	0.0047	1	10/02/02	10/26/02	KWG0207657	
Endosulfan Sulfate	ND	U	0.0099	0.0067	1	10/02/02	10/26/02	KWG0207657	
4,4'-DDT	ND	U	0.0099	0.0051	1	10/02/02	10/26/02	KWG0207657	
Endrin Ketone	ND	U	0.0099	0.0061	1	10/02/02	10/26/02	KWG0207657	
Methoxychlor	ND	U	0.0099	0.0069	1	10/02/02	10/26/02	KWG0207657	
Toxaphene	ND	U	0.50	0.050	1	10/02/02	10/26/02	KWG0207657	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	66	28-105	10/26/02	Acceptable
Decachlorobiphenyl	83	10-134	10/26/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Water

Service Request: K2206977
Date Collected: NA
Date Received: NA

Organochlorine Pesticides

Sample Name: Method Blank
Lab Code: KWG0207657-4

Extraction Method: EPA 3520C
Analysis Method: 8081A

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.010	0.0055	1	10/02/02	10/26/02	KWG0207657	
beta-BHC	ND	U	0.010	0.0042	1	10/02/02	10/26/02	KWG0207657	
gamma-BHC (Lindane)	ND	U	0.010	0.0042	1	10/02/02	10/26/02	KWG0207657	
delta-BHC	ND	U	0.010	0.0050	1	10/02/02	10/26/02	KWG0207657	
Heptachlor	ND	U	0.010	0.0049	1	10/02/02	10/26/02	KWG0207657	
Aldrin	ND	U	0.010	0.0034	1	10/02/02	10/26/02	KWG0207657	
Heptachlor Epoxide	ND	U	0.010	0.0084	1	10/02/02	10/26/02	KWG0207657	
gamma-Chlordane	ND	U	0.010	0.0075	1	10/02/02	10/26/02	KWG0207657	
Endosulfan I	ND	U	0.010	0.0055	1	10/02/02	10/26/02	KWG0207657	
alpha-Chlordane	ND	U	0.010	0.0061	1	10/02/02	10/26/02	KWG0207657	
Dieldrin	ND	U	0.010	0.0068	1	10/02/02	10/26/02	KWG0207657	
4,4'-DDE	ND	U	0.010	0.0083	1	10/02/02	10/26/02	KWG0207657	
Endrin	ND	U	0.010	0.0047	1	10/02/02	10/26/02	KWG0207657	
Endosulfan II	ND	U	0.010	0.0059	1	10/02/02	10/26/02	KWG0207657	
4,4'-DDD	ND	U	0.010	0.0052	1	10/02/02	10/26/02	KWG0207657	
Endrin Aldehyde	ND	U	0.010	0.0047	1	10/02/02	10/26/02	KWG0207657	
Endosulfan Sulfate	ND	U	0.010	0.0067	1	10/02/02	10/26/02	KWG0207657	
4,4'-DDT	ND	U	0.010	0.0051	1	10/02/02	10/26/02	KWG0207657	
Endrin Ketone	ND	U	0.010	0.0061	1	10/02/02	10/26/02	KWG0207657	
Methoxychlor	ND	U	0.010	0.0069	1	10/02/02	10/26/02	KWG0207657	
Toxaphene	ND	U	0.50	0.050	1	10/02/02	10/26/02	KWG0207657	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	65	28-105	10/26/02	Acceptable
Decachlorobiphenyl	101	10-134	10/26/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-016	**Units:**	ug/Kg
Lab Code:	K2206977-001	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**5.6**		2.2	0.22	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	2.2	0.66	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	**6.0**	P	2.2	0.53	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	2.2	0.80	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	U	2.2	0.30	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**1.1**	J	2.2	0.51	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	2.2	0.30	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	ND	Ui	2.2	0.42	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	**0.68**	JP	2.2	0.27	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.2	0.46	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	2.2	0.66	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**1.9**	J	2.2	0.53	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	2.2	0.29	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	2.2	0.47	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**0.66**	JP	2.2	0.33	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	2.2	0.77	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.2	0.35	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	2.2	0.37	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	2.2	0.35	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	2.2	0.72	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	110	34	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	81	48-119	10/18/02	Acceptable
Decachlorobiphenyl	77	48-136	10/18/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-017	**Units:**	ug/Kg
Lab Code:	K2206977-002	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**2.3**		1.8	0.19	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	1.8	1.8	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	U	1.8	0.44	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	1.8	0.67	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	U	1.8	0.25	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**0.79**	J	1.8	0.43	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	1.8	0.25	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	ND	Ui	1.8	0.35	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	ND	Ui	1.8	0.27	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	1.8	1.2	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	1.8	0.56	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**1.9**		1.8	0.45	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	1.8	0.24	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	1.8	0.40	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**1.2**	J	1.8	0.28	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	1.8	0.64	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	1.8	0.29	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	**0.87**	JP	1.8	0.31	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	1.8	0.29	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	1.8	0.39	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	90	31	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	80	48-119	10/18/02	Acceptable
Decachlorobiphenyl	78	48-136	10/18/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/22/2002
Date Received: 10/01/2002

Organochlorine Pesticides

Sample Name: SF-DODS-019
Lab Code: K2206977-003

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3540C
Analysis Method: 8081A

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**11**		2.7	0.28	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	2.7	1.8	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	4.8	4.8	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	Ui	2.7	1.4	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	U	2.7	0.36	1	10/04/02	10/18/02	KWG0207705	
Aldrin	ND	Ui	3.9	3.9	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	2.7	0.37	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	ND	U	2.7	0.40	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	**1.5**	J	2.7	0.33	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.7	2.7	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	2.7	0.82	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**3.4**		2.7	0.66	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	Ui	2.7	0.68	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	Ui	2.7	2.7	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**1.9**	J	2.7	0.41	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	2.7	0.94	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.7	0.43	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	Ui	2.7	1.1	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	2.7	0.43	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	2.7	1.2	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	140	46	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	99	48-119	10/18/02	Acceptable
Decachlorobiphenyl	80	48-136	10/18/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-020	**Units:**	ug/Kg
Lab Code:	K2206977-004	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	3.1	3.1	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	3.1	0.96	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	6.8	6.8	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	3.1	1.2	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	Ui	3.1	0.74	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**3.6**	P	3.1	0.71	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	3.1	0.42	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	**1.1**	JP	3.1	0.45	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	ND	Ui	3.1	0.55	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	3.1	3.1	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	3.1	0.93	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**2.7**	J	3.1	0.75	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	3.1	0.40	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	3.1	0.66	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**0.76**	JP	3.1	0.46	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	3.1	1.1	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	3.1	0.49	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	3.1	0.52	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	3.1	0.49	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	3.1	1.5	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	160	44	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	85	48-119	10/18/02	Acceptable
Decachlorobiphenyl	79	48-136	10/18/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/22/2002
Date Received: 10/01/2002

Organochlorine Pesticides

Sample Name: SF-DODS-010
Lab Code: K2206977-005

Extraction Method: EPA 3540C
Analysis Method: 8081A

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	2.4	2.4	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	2.4	2.4	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	2.4	2.4	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	2.4	0.89	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	U	2.4	0.33	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**1.8**	J	2.4	0.56	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	2.4	0.33	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	**1.4**	J	2.4	0.36	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	**0.68**	JP	2.4	0.30	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.4	2.3	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	Ui	3.4	3.4	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**2.8**		2.4	0.59	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	2.4	0.32	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	Ui	2.4	0.73	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**0.70**	J	2.4	0.37	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	2.4	0.85	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.4	0.39	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	2.4	0.41	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	2.4	0.39	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	2.4	0.91	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	120	52	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	89	48-119	10/18/02	Acceptable
Decachlorobiphenyl	80	48-136	10/18/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-006	**Units:**	ug/Kg
Lab Code:	K2206977-006	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**10**		2.9	0.30	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	2.9	2.9	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	2.9	2.9	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	2.9	1.1	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	Ui	2.9	0.61	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**3.6**		2.9	0.67	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	Ui	2.9	2.2	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	**1.3**	JP	2.9	0.42	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	**0.45**	J	2.9	0.36	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.9	2.9	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	2.9	0.88	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**5.5**		2.9	0.70	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	2.9	0.38	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	2.9	0.63	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**1.3**	JP	2.9	0.44	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	2.9	1.1	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.9	0.46	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	2.9	0.49	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	Ui	2.9	2.9	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	2.9	1.6	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	150	78	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	108	48-119	10/18/02	Acceptable
Decachlorobiphenyl	82	48-136	10/18/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-027	**Units:**	ug/Kg
Lab Code:	K2206977-007	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**7.0**		2.6	0.27	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	**3.3**	P	2.6	0.39	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	**5.5**		2.6	0.64	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	Ui	2.8	2.8	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	Ui	2.6	0.65	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**2.1**	J	2.6	0.61	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	2.6	0.36	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	**1.3**	J	2.6	0.39	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	ND	Ui	2.6	2.6	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.6	0.56	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	2.6	0.80	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**3.7**		2.6	0.64	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	2.6	0.35	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	Ui	2.6	0.94	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**1.1**	JP	2.6	0.40	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	2.6	0.92	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.6	0.42	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	2.6	0.45	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	2.6	0.42	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	2.6	1.3	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	130	39	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	91	48-119	10/18/02	Acceptable
Decachlorobiphenyl	78	48-136	10/18/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-057	**Units:**	ug/Kg
Lab Code:	K2206977-008	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**2.0**	JP	2.3	0.24	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	**1.7**	JP	2.3	0.35	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	**2.3**	JP	2.3	0.57	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	**1.0**	J	2.3	0.87	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	**0.63**	J	2.3	0.32	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**2.0**	J	2.3	0.55	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	Ui	2.3	2.3	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	ND	Ui	2.3	2.3	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	ND	Ui	2.3	2.3	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.3	1.1	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	2.3	0.72	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**3.1**		2.3	0.58	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	2.3	0.31	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	2.3	0.51	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	ND	Ui	2.3	2.3	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	2.3	0.83	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	**1.0**	JP	2.3	0.38	1	10/04/02	10/18/02	KWG0207705	*
4,4'-DDT	ND	Ui	2.3	1.2	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	2.3	0.38	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	2.3	1.1	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	120	100	1	10/04/02	10/18/02	KWG0207705	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	89	48-119	10/18/02	Acceptable
Decachlorobiphenyl	79	48-136	10/18/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-092	**Units:**	ug/Kg
Lab Code:	K2206977-009	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**7.7**		3.6	0.37	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	Ui	3.6	0.93	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	3.6	3.6	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	3.6	1.4	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	U	3.6	0.49	1	10/04/02	10/18/02	KWG0207705	
Aldrin	**2.8**	J	3.6	0.84	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	3.6	0.49	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	**1.4**	J	3.6	0.53	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	ND	Ui	3.6	0.85	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	Ui	3.6	1.4	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	3.6	1.1	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	**5.3**		3.6	0.88	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	3.6	0.48	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	3.6	0.78	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	**1.4**	JP	3.6	0.54	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	3.6	1.3	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	3.6	0.58	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	3.6	0.61	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	3.6	0.57	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	Ui	3.6	1.6	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	Ui	180	59	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	95	48-119	10/18/02	Acceptable
Decachlorobiphenyl	79	48-136	10/18/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-050	**Units:**	ug/Kg
Lab Code:	K2206977-010	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	3.1	3.1	1	10/04/02	10/19/02	KWG0207705	
beta-BHC	ND	Ui	3.1	3.1	1	10/04/02	10/19/02	KWG0207705	
gamma-BHC (Lindane)	**20**	P	3.1	0.74	1	10/04/02	10/19/02	KWG0207705	
delta-BHC	ND	Ui	3.1	1.4	1	10/04/02	10/19/02	KWG0207705	
Heptachlor	ND	Ui	3.1	0.73	1	10/04/02	10/19/02	KWG0207705	
Aldrin	**2.8**	J	3.1	0.71	1	10/04/02	10/19/02	KWG0207705	
Heptachlor Epoxide	ND	U	3.1	0.42	1	10/04/02	10/19/02	KWG0207705	
gamma-Chlordane	**1.0**	JP	3.1	0.45	1	10/04/02	10/19/02	KWG0207705	
Endosulfan I	**1.9**	JP	3.1	0.38	1	10/04/02	10/19/02	KWG0207705	
alpha-Chlordane	ND	Ui	3.1	0.90	1	10/04/02	10/19/02	KWG0207705	
Dieldrin	ND	U	3.1	0.94	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDE	**4.6**		3.1	0.75	1	10/04/02	10/19/02	KWG0207705	
Endrin	ND	U	3.1	0.41	1	10/04/02	10/19/02	KWG0207705	
Endosulfan II	ND	U	3.1	0.67	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDD	**1.5**	J	3.1	0.46	1	10/04/02	10/19/02	KWG0207705	
Endrin Aldehyde	ND	U	3.1	1.1	1	10/04/02	10/19/02	KWG0207705	
Endosulfan Sulfate	ND	U	3.1	0.49	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDT	**0.53**	J	3.1	0.52	1	10/04/02	10/19/02	KWG0207705	
Endrin Ketone	ND	U	3.1	0.49	1	10/04/02	10/19/02	KWG0207705	
Methoxychlor	ND	U	3.1	0.49	1	10/04/02	10/19/02	KWG0207705	
Toxaphene	ND	U	160	28	1	10/04/02	10/19/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	80	48-119	10/19/02	Acceptable
Decachlorobiphenyl	77	48-136	10/19/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-116	**Units:**	ug/Kg
Lab Code:	K2206977-011	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**12**		3.1	0.32	1	10/04/02	10/19/02	KWG0207705	
beta-BHC	ND	Ui	3.1	0.83	1	10/04/02	10/19/02	KWG0207705	
gamma-BHC (Lindane)	ND	U	3.1	0.75	1	10/04/02	10/19/02	KWG0207705	
delta-BHC	ND	U	3.1	1.2	1	10/04/02	10/19/02	KWG0207705	
Heptachlor	ND	U	3.1	0.42	1	10/04/02	10/19/02	KWG0207705	
Aldrin	**2.6**	JP	3.1	0.72	1	10/04/02	10/19/02	KWG0207705	
Heptachlor Epoxide	ND	U	3.1	0.42	1	10/04/02	10/19/02	KWG0207705	
gamma-Chlordane	**0.64**	J	3.1	0.45	1	10/04/02	10/19/02	KWG0207705	
Endosulfan I	**1.9**	JP	3.1	0.38	1	10/04/02	10/19/02	KWG0207705	
alpha-Chlordane	ND	Ui	3.1	3.1	1	10/04/02	10/19/02	KWG0207705	
Dieldrin	ND	U	3.1	0.94	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDE	**4.0**		3.1	0.75	1	10/04/02	10/19/02	KWG0207705	
Endrin	ND	U	3.1	0.41	1	10/04/02	10/19/02	KWG0207705	
Endosulfan II	ND	U	3.1	0.67	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDD	**1.4**	JP	3.1	0.47	1	10/04/02	10/19/02	KWG0207705	
Endrin Aldehyde	ND	U	3.1	1.1	1	10/04/02	10/19/02	KWG0207705	
Endosulfan Sulfate	ND	U	3.1	0.49	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDT	ND	U	3.1	0.52	1	10/04/02	10/19/02	KWG0207705	
Endrin Ketone	ND	U	3.1	0.49	1	10/04/02	10/19/02	KWG0207705	
Methoxychlor	ND	Ui	3.1	1.3	1	10/04/02	10/19/02	KWG0207705	
Toxaphene	ND	Ui	160	52	1	10/04/02	10/19/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	90	48-119	10/19/02	Acceptable
Decachlorobiphenyl	78	48-136	10/19/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-064	**Units:**	ug/Kg
Lab Code:	K2206977-012	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	3.3	3.3	1	10/04/02	10/19/02	KWG0207705	
beta-BHC	ND	Ui	3.3	0.97	1	10/04/02	10/19/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	8.2	8.2	1	10/04/02	10/19/02	KWG0207705	
delta-BHC	ND	U	3.3	1.3	1	10/04/02	10/19/02	KWG0207705	
Heptachlor	ND	U	3.3	0.45	1	10/04/02	10/19/02	KWG0207705	
Aldrin	**1.9**	J	3.3	0.77	1	10/04/02	10/19/02	KWG0207705	
Heptachlor Epoxide	ND	U	3.3	0.45	1	10/04/02	10/19/02	KWG0207705	
gamma-Chlordane	ND	U	3.3	0.49	1	10/04/02	10/19/02	KWG0207705	
Endosulfan I	ND	Ui	3.3	0.50	1	10/04/02	10/19/02	KWG0207705	
alpha-Chlordane	ND	Ui	3.3	0.73	1	10/04/02	10/19/02	KWG0207705	
Dieldrin	ND	U	3.3	1.1	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDE	**3.2**	J	3.3	0.81	1	10/04/02	10/19/02	KWG0207705	
Endrin	ND	U	3.3	0.44	1	10/04/02	10/19/02	KWG0207705	
Endosulfan II	ND	U	3.3	0.72	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDD	**0.85**	JP	3.3	0.50	1	10/04/02	10/19/02	KWG0207705	
Endrin Aldehyde	ND	U	3.3	1.2	1	10/04/02	10/19/02	KWG0207705	
Endosulfan Sulfate	ND	U	3.3	0.53	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDT	ND	U	3.3	0.56	1	10/04/02	10/19/02	KWG0207705	
Endrin Ketone	ND	U	3.3	0.53	1	10/04/02	10/19/02	KWG0207705	
Methoxychlor	ND	Ui	3.3	1.3	1	10/04/02	10/19/02	KWG0207705	
Toxaphene	ND	Ui	170	51	1	10/04/02	10/19/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	83	48-119	10/19/02	Acceptable
Decachlorobiphenyl	73	48-136	10/19/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/26/2002
Date Received: 10/01/2002

Organochlorine Pesticides

Sample Name: SF-DODS-023
Lab Code: K2206977-013

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3540C
Analysis Method: 8081A

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	2.7	2.7	1	10/04/02	10/19/02	KWG0207705	
beta-BHC	ND	Ui	2.7	1.1	1	10/04/02	10/19/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	2.7	2.7	1	10/04/02	10/19/02	KWG0207705	
delta-BHC	ND	Ui	2.7	2.0	1	10/04/02	10/19/02	KWG0207705	
Heptachlor	ND	U	2.7	0.37	1	10/04/02	10/19/02	KWG0207705	
Aldrin	**2.2**	J	2.7	0.63	1	10/04/02	10/19/02	KWG0207705	
Heptachlor Epoxide	ND	U	2.7	0.37	1	10/04/02	10/19/02	KWG0207705	
gamma-Chlordane	**2.3**	JP	2.7	0.40	1	10/04/02	10/19/02	KWG0207705	
Endosulfan I	**2.5**	JP	2.7	0.34	1	10/04/02	10/19/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.7	0.67	1	10/04/02	10/19/02	KWG0207705	
Dieldrin	ND	U	2.7	0.83	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDE	**3.1**		2.7	0.66	1	10/04/02	10/19/02	KWG0207705	
Endrin	ND	U	2.7	0.36	1	10/04/02	10/19/02	KWG0207705	
Endosulfan II	ND	U	2.7	0.59	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDD	**0.66**	JP	2.7	0.41	1	10/04/02	10/19/02	KWG0207705	
Endrin Aldehyde	ND	U	2.7	0.95	1	10/04/02	10/19/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.7	0.44	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDT	**0.49**	J	2.7	0.46	1	10/04/02	10/19/02	KWG0207705	
Endrin Ketone	ND	U	2.7	0.43	1	10/04/02	10/19/02	KWG0207705	
Methoxychlor	ND	Ui	2.7	1.2	1	10/04/02	10/19/02	KWG0207705	
Toxaphene	ND	Ui	140	47	1	10/04/02	10/19/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	96	48-119	10/19/02	Acceptable
Decachlorobiphenyl	80	48-136	10/19/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-114	**Units:**	ug/Kg
Lab Code:	K2206977-014	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	2.9	2.9	1	10/04/02	10/19/02	KWG0207705	
beta-BHC	ND	Ui	2.9	2.9	1	10/04/02	10/19/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	2.9	2.9	1	10/04/02	10/19/02	KWG0207705	
delta-BHC	**1.9**	JP	2.9	1.1	1	10/04/02	10/19/02	KWG0207705	
Heptachlor	ND	Ui	2.9	0.55	1	10/04/02	10/19/02	KWG0207705	
Aldrin	ND	Ui	2.9	2.9	1	10/04/02	10/19/02	KWG0207705	
Heptachlor Epoxide	ND	Ui	2.9	0.51	1	10/04/02	10/19/02	KWG0207705	
gamma-Chlordane	ND	Ui	2.9	2.9	1	10/04/02	10/19/02	KWG0207705	
Endosulfan I	ND	Ui	2.9	0.67	1	10/04/02	10/19/02	KWG0207705	
alpha-Chlordane	ND	Ui	2.9	0.58	1	10/04/02	10/19/02	KWG0207705	
Dieldrin	**2.0**	JP	2.9	0.87	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDE	**3.6**		2.9	0.70	1	10/04/02	10/19/02	KWG0207705	
Endrin	ND	U	2.9	0.38	1	10/04/02	10/19/02	KWG0207705	
Endosulfan II	ND	U	2.9	0.62	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDD	**4.6**		2.9	0.43	1	10/04/02	10/19/02	KWG0207705	
Endrin Aldehyde	ND	U	2.9	1.0	1	10/04/02	10/19/02	KWG0207705	
Endosulfan Sulfate	ND	U	2.9	0.46	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDT	**3.3**		2.9	0.48	1	10/04/02	10/19/02	KWG0207705	
Endrin Ketone	ND	U	2.9	0.45	1	10/04/02	10/19/02	KWG0207705	
Methoxychlor	ND	Ui	2.9	0.66	1	10/04/02	10/19/02	KWG0207705	
Toxaphene	ND	Ui	150	110	1	10/04/02	10/19/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	79	48-119	10/19/02	Acceptable
Decachlorobiphenyl	85	48-136	10/19/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-013	**Units:**	ug/Kg
Lab Code:	K2206977-015	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	**1.1**	JP	1.9	0.20	1	10/04/02	10/19/02	KWG0207705	
beta-BHC	ND	Ui	1.9	0.44	1	10/04/02	10/19/02	KWG0207705	
gamma-BHC (Lindane)	ND	Ui	2.5	2.5	1	10/04/02	10/19/02	KWG0207705	
delta-BHC	ND	U	1.9	0.71	1	10/04/02	10/19/02	KWG0207705	
Heptachlor	ND	U	1.9	0.26	1	10/04/02	10/19/02	KWG0207705	
Aldrin	**0.72**	J	1.9	0.45	1	10/04/02	10/19/02	KWG0207705	
Heptachlor Epoxide	ND	U	1.9	0.26	1	10/04/02	10/19/02	KWG0207705	
gamma-Chlordane	ND	U	1.9	0.28	1	10/04/02	10/19/02	KWG0207705	
Endosulfan I	**0.76**	JP	1.9	0.24	1	10/04/02	10/19/02	KWG0207705	
alpha-Chlordane	ND	Ui	1.9	0.43	1	10/04/02	10/19/02	KWG0207705	
Dieldrin	ND	U	1.9	0.59	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDE	**1.8**	J	1.9	0.47	1	10/04/02	10/19/02	KWG0207705	
Endrin	ND	U	1.9	0.26	1	10/04/02	10/19/02	KWG0207705	
Endosulfan II	ND	U	1.9	0.42	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDD	**0.36**	JP	1.9	0.29	1	10/04/02	10/19/02	KWG0207705	
Endrin Aldehyde	ND	U	1.9	0.68	1	10/04/02	10/19/02	KWG0207705	
Endosulfan Sulfate	ND	U	1.9	0.31	1	10/04/02	10/19/02	KWG0207705	
4,4'-DDT	ND	U	1.9	0.33	1	10/04/02	10/19/02	KWG0207705	
Endrin Ketone	ND	U	1.9	0.31	1	10/04/02	10/19/02	KWG0207705	
Methoxychlor	ND	Ui	1.9	0.84	1	10/04/02	10/19/02	KWG0207705	
Toxaphene	ND	U	95	18	1	10/04/02	10/19/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	73	48-119	10/19/02	Acceptable
Decachlorobiphenyl	76	48-136	10/19/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Organochlorine Pesticides

Sample Name:	SF-DODS-013 Dup	**Units:**	ug/Kg
Lab Code:	K2206977-017	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	Ui	1.9	0.20	1	10/14/02	10/20/02	KWG0208088	
beta-BHC	ND	U	1.9	0.27	1	10/14/02	10/20/02	KWG0208088	
gamma-BHC (Lindane)	ND	U	1.9	0.45	1	10/14/02	10/20/02	KWG0208088	
delta-BHC	ND	U	1.9	0.68	1	10/14/02	10/20/02	KWG0208088	
Heptachlor	ND	U	1.9	0.25	1	10/14/02	10/20/02	KWG0208088	
Aldrin	ND	U	1.9	0.43	1	10/14/02	10/20/02	KWG0208088	
Heptachlor Epoxide	ND	U	1.9	0.25	1	10/14/02	10/20/02	KWG0208088	
gamma-Chlordane	ND	Ui	1.9	1.9	1	10/14/02	10/20/02	KWG0208088	
Endosulfan I	ND	U	1.9	0.23	1	10/14/02	10/20/02	KWG0208088	
alpha-Chlordane	ND	Ui	1.9	1.9	1	10/14/02	10/20/02	KWG0208088	
Dieldrin	ND	U	1.9	0.56	1	10/14/02	10/20/02	KWG0208088	
4,4'-DDE	**1.8**	J	1.9	0.45	1	10/14/02	10/20/02	KWG0208088	
Endrin	ND	U	1.9	0.25	1	10/14/02	10/20/02	KWG0208088	
Endosulfan II	ND	U	1.9	0.40	1	10/14/02	10/20/02	KWG0208088	
4,4'-DDD	**2.4**		1.9	0.28	1	10/14/02	10/20/02	KWG0208088	
Endrin Aldehyde	ND	U	1.9	0.65	1	10/14/02	10/20/02	KWG0208088	
Endosulfan Sulfate	ND	U	1.9	0.30	1	10/14/02	10/20/02	KWG0208088	
4,4'-DDT	**1.5**	J	1.9	0.31	1	10/14/02	10/20/02	KWG0208088	
Endrin Ketone	ND	Ui	1.9	1.9	1	10/14/02	10/20/02	KWG0208088	
Methoxychlor	ND	U	1.9	0.30	1	10/14/02	10/20/02	KWG0208088	
Toxaphene	**44**	J	91	17	1	10/14/02	10/20/02	KWG0208088	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	80	48-119	10/20/02	Acceptable
Decachlorobiphenyl	84	48-136	10/20/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: NA
Date Received: NA

Organochlorine Pesticides

Sample Name: Method Blank
Lab Code: KWG0207705-4

Extraction Method: EPA 3540C
Analysis Method: 8081A

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	1.0	0.11	1	10/04/02	10/18/02	KWG0207705	
beta-BHC	ND	U	1.0	0.15	1	10/04/02	10/18/02	KWG0207705	
gamma-BHC (Lindane)	ND	U	1.0	0.25	1	10/04/02	10/18/02	KWG0207705	
delta-BHC	ND	U	1.0	0.37	1	10/04/02	10/18/02	KWG0207705	
Heptachlor	ND	U	1.0	0.14	1	10/04/02	10/18/02	KWG0207705	
Aldrin	ND	U	1.0	0.24	1	10/04/02	10/18/02	KWG0207705	
Heptachlor Epoxide	ND	U	1.0	0.14	1	10/04/02	10/18/02	KWG0207705	
gamma-Chlordane	ND	U	1.0	0.15	1	10/04/02	10/18/02	KWG0207705	
Endosulfan I	ND	U	1.0	0.13	1	10/04/02	10/18/02	KWG0207705	
alpha-Chlordane	ND	U	1.0	0.11	1	10/04/02	10/18/02	KWG0207705	
Dieldrin	ND	U	1.0	0.31	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDE	ND	U	1.0	0.25	1	10/04/02	10/18/02	KWG0207705	
Endrin	ND	U	1.0	0.14	1	10/04/02	10/18/02	KWG0207705	
Endosulfan II	ND	U	1.0	0.22	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDD	ND	U	1.0	0.16	1	10/04/02	10/18/02	KWG0207705	
Endrin Aldehyde	ND	U	1.0	0.36	1	10/04/02	10/18/02	KWG0207705	
Endosulfan Sulfate	ND	U	1.0	0.16	1	10/04/02	10/18/02	KWG0207705	
4,4'-DDT	ND	U	1.0	0.17	1	10/04/02	10/18/02	KWG0207705	
Endrin Ketone	ND	U	1.0	0.16	1	10/04/02	10/18/02	KWG0207705	
Methoxychlor	ND	U	1.0	0.17	1	10/04/02	10/18/02	KWG0207705	
Toxaphene	ND	U	50	9.2	1	10/04/02	10/18/02	KWG0207705	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	76	48-119	10/18/02	Acceptable
Decachlorobiphenyl	86	48-136	10/18/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: NA
Date Received: NA

Organochlorine Pesticides

Sample Name: Method Blank
Lab Code: KWG0208088-4

Extraction Method: EPA 3540C
Analysis Method: 8081A

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	1.0	0.11	1	10/14/02	10/20/02	KWG0208088	
beta-BHC	ND	U	1.0	0.15	1	10/14/02	10/20/02	KWG0208088	
gamma-BHC (Lindane)	ND	U	1.0	0.25	1	10/14/02	10/20/02	KWG0208088	
delta-BHC	ND	U	1.0	0.37	1	10/14/02	10/20/02	KWG0208088	
Heptachlor	ND	U	1.0	0.14	1	10/14/02	10/20/02	KWG0208088	
Aldrin	ND	U	1.0	0.24	1	10/14/02	10/20/02	KWG0208088	
Heptachlor Epoxide	ND	U	1.0	0.14	1	10/14/02	10/20/02	KWG0208088	
gamma-Chlordane	ND	U	1.0	0.15	1	10/14/02	10/20/02	KWG0208088	
Endosulfan I	ND	U	1.0	0.13	1	10/14/02	10/20/02	KWG0208088	
alpha-Chlordane	ND	U	1.0	0.11	1	10/14/02	10/20/02	KWG0208088	
Dieldrin	ND	U	1.0	0.31	1	10/14/02	10/20/02	KWG0208088	
4,4'-DDE	ND	U	1.0	0.25	1	10/14/02	10/20/02	KWG0208088	
Endrin	ND	U	1.0	0.14	1	10/14/02	10/20/02	KWG0208088	
Endosulfan II	ND	U	1.0	0.22	1	10/14/02	10/20/02	KWG0208088	
4,4'-DDD	ND	U	1.0	0.16	1	10/14/02	10/20/02	KWG0208088	
Endrin Aldehyde	ND	U	1.0	0.36	1	10/14/02	10/20/02	KWG0208088	
Endosulfan Sulfate	ND	U	1.0	0.16	1	10/14/02	10/20/02	KWG0208088	
4,4'-DDT	ND	U	1.0	0.17	1	10/14/02	10/20/02	KWG0208088	
Endrin Ketone	ND	U	1.0	0.16	1	10/14/02	10/20/02	KWG0208088	
Methoxychlor	ND	U	1.0	0.17	1	10/14/02	10/20/02	KWG0208088	
Toxaphene	ND	U	50	9.2	1	10/14/02	10/20/02	KWG0208088	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	82	48-119	10/20/02	Acceptable
Decachlorobiphenyl	115	48-136	10/20/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/27/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-016	**Units:**	ug/Kg
Lab Code:	K2206977-001	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F023.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.08 g	**Column2:**	DB-XLB
% Solids:	46.4		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	1.8	U	22	1.8	
11104-28-2	Aroclor 1221	1.8	U	44	1.8	
11141-16-5	Aroclor 1232	1.8	U	22	1.8	
53469-21-9	Aroclor 1242	1.8	U	22	1.8	
12672-29-6	Aroclor 1248	1.8	U	22	1.8	
11097-69-1	Aroclor 1254	1.8	U	22	1.8	
11096-82-5	Aroclor 1260	1.8	U	22	1.8	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	101	57-149	10/27/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/27/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-017	**Units:**	ug/Kg
Lab Code:	K2206977-002	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F024.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.17 g	**Column2:**	DB-XLB
% Solids:	55.4		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	1.5	U	18	1.5	
11104-28-2	Aroclor 1221	1.5	U	36	1.5	
11141-16-5	Aroclor 1232	1.5	U	18	1.5	
53469-21-9	Aroclor 1242	1.5	U	18	1.5	
12672-29-6	Aroclor 1248	1.5	U	18	1.5	
11097-69-1	**Aroclor 1254**	**5.5**	J	18	1.5	
11096-82-5	Aroclor 1260	1.5	U	18	1.5	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	102	57-149	10/27/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/27/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-019	**Units:**	ug/Kg
Lab Code:	K2206977-003	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F025.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.81 g	**Column2:**	DB-XLB
% Solids:	37.6		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.2	U	27	2.2	
11104-28-2	Aroclor 1221	2.2	U	53	2.2	
11141-16-5	Aroclor 1232	2.2	U	27	2.2	
53469-21-9	Aroclor 1242	2.2	U	27	2.2	
12672-29-6	Aroclor 1248	2.2	U	27	2.2	
11097-69-1	Aroclor 1254	2.2	U	27	2.2	
11096-82-5	Aroclor 1260	2.2	U	27	2.2	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	106	57-149	10/27/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-020	**Units:**	ug/Kg
Lab Code:	K2206977-004	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F026.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.01 g	**Column2:**	DB-XLB
% Solids:	33.1		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.5	U	31	2.5	
11104-28-2	Aroclor 1221	2.5	U	61	2.5	
11141-16-5	Aroclor 1232	2.5	U	31	2.5	
53469-21-9	Aroclor 1242	2.5	U	31	2.5	
12672-29-6	Aroclor 1248	2.5	U	31	2.5	
11097-69-1	Aroclor 1254	2.5	U	31	2.5	
11096-82-5	Aroclor 1260	2.5	U	31	2.5	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	107	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-010	**Units:**	ug/Kg
Lab Code:	K2206977-005	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F027.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.80 g	**Column2:**	DB-XLB
% Solids:	41.8		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.0	U	24	2.0	
11104-28-2	Aroclor 1221	2.0	U	47	2.0	
11141-16-5	Aroclor 1232	2.0	U	24	2.0	
53469-21-9	Aroclor 1242	2.0	U	24	2.0	
12672-29-6	Aroclor 1248	2.0	U	24	2.0	
11097-69-1	**Aroclor 1254**	**3.5**	J	24	2.0	
11096-82-5	Aroclor 1260	2.0	U	24	2.0	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	109	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-006	**Units:**	ug/Kg
Lab Code:	K2206977-006	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F028.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.25 g	**Column2:**	DB-XLB
% Solids:	35.1		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.4	U	29	2.4	
11104-28-2	Aroclor 1221	2.4	U	57	2.4	
11141-16-5	Aroclor 1232	2.4	U	29	2.4	
53469-21-9	Aroclor 1242	2.4	U	29	2.4	
12672-29-6	Aroclor 1248	2.4	U	29	2.4	
11097-69-1	**Aroclor 1254**	**4.9**	J	29	2.4	
11096-82-5	Aroclor 1260	2.4	U	29	2.4	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	110	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-027	**Units:**	ug/Kg
Lab Code:	K2206977-007	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F029.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.37 g	**Column2:**	DB-XLB
% Solids:	38.4		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.2	U	26	2.2	
11104-28-2	Aroclor 1221	2.2	U	52	2.2	
11141-16-5	Aroclor 1232	2.2	U	26	2.2	
53469-21-9	Aroclor 1242	2.2	U	26	2.2	
12672-29-6	Aroclor 1248	2.2	U	26	2.2	
11097-69-1	**Aroclor 1254**	**4.0**	J	26	2.2	
11096-82-5	Aroclor 1260	2.2	U	26	2.2	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	106	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-057	**Units:**	ug/Kg
Lab Code:	K2206977-008	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F030.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.74 g	**Column2:**	DB-XLB
% Solids:	42.9		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.0	U	23	2.0	
11104-28-2	Aroclor 1221	2.0	U	46	2.0	
11141-16-5	Aroclor 1232	2.0	U	23	2.0	
53469-21-9	Aroclor 1242	2.0	U	23	2.0	
12672-29-6	Aroclor 1248	2.0	U	23	2.0	
11097-69-1	**Aroclor 1254**	**3.8**	J	23	2.0	
11096-82-5	Aroclor 1260	2.0	U	23	2.0	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	109	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-092	**Units:**	ug/Kg
Lab Code:	K2206977-009	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F034.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.03 g	**Column2:**	DB-XLB
% Solids:	28.0		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	3.0	U	36	3.0	
11104-28-2	Aroclor 1221	3.0	U	72	3.0	
11141-16-5	Aroclor 1232	3.0	U	36	3.0	
53469-21-9	Aroclor 1242	3.0	U	36	3.0	
12672-29-6	Aroclor 1248	3.0	U	36	3.0	
11097-69-1	**Aroclor 1254**	**6.5**	J	36	3.0	
11096-82-5	Aroclor 1260	3.0	U	36	3.0	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	108	57-149	10/28/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-050	**Units:**	ug/Kg
Lab Code:	K2206977-010	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F035.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.35 g	**Column2:**	DB-XLB
% Solids:	32.9		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.5	U	31	2.5	
11104-28-2	Aroclor 1221	2.5	U	61	2.5	
11141-16-5	Aroclor 1232	2.5	U	31	2.5	
53469-21-9	Aroclor 1242	2.5	U	31	2.5	
12672-29-6	Aroclor 1248	2.5	U	31	2.5	
11097-69-1	**Aroclor 1254**	**3.0**	J	31	2.5	
11096-82-5	Aroclor 1260	2.5	U	31	2.5	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	106	57-149	10/28/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-116	**Units:**	ug/Kg
Lab Code:	K2206977-011	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F036.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.07 g	**Column2:**	DB-XLB
% Solids:	32.7		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.6	U	31	2.6	
11104-28-2	Aroclor 1221	2.6	U	62	2.6	
11141-16-5	Aroclor 1232	2.6	U	31	2.6	
53469-21-9	Aroclor 1242	2.6	U	31	2.6	
12672-29-6	Aroclor 1248	2.6	U	31	2.6	
11097-69-1	Aroclor 1254	2.6	U	31	2.6	
11096-82-5	Aroclor 1260	2.6	U	31	2.6	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	108	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-064	**Units:**	ug/Kg
Lab Code:	K2206977-012	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F037.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.06 g	**Column2:**	DB-XLB
% Solids:	30.5		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.7	U	33	2.7	
11104-28-2	Aroclor 1221	2.7	U	66	2.7	
11141-16-5	Aroclor 1232	2.7	U	33	2.7	
53469-21-9	Aroclor 1242	2.7	U	33	2.7	
12672-29-6	Aroclor 1248	2.7	U	33	2.7	
11097-69-1	Aroclor 1254	2.7	U	33	2.7	
11096-82-5	Aroclor 1260	2.7	U	33	2.7	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	101	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-023	**Units:**	ug/Kg
Lab Code:	K2206977-013	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F038.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.04 g	**Column2:**	DB-XLB
% Solids:	37.2		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.3	U	27	2.3	
11104-28-2	Aroclor 1221	2.3	U	54	2.3	
11141-16-5	Aroclor 1232	2.3	U	27	2.3	
53469-21-9	Aroclor 1242	2.3	U	27	2.3	
12672-29-6	Aroclor 1248	2.3	U	27	2.3	
11097-69-1	**Aroclor 1254**	**4.4**	J	27	2.3	
11096-82-5	Aroclor 1260	2.3	U	27	2.3	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	112	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-114	**Units:**	ug/Kg
Lab Code:	K2206977-014	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F039.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.02 g	**Column2:**	DB-XLB
% Solids:	35.5		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	2.4	U	29	2.4	
11104-28-2	Aroclor 1221	2.4	U	57	2.4	
11141-16-5	Aroclor 1232	2.4	U	29	2.4	
53469-21-9	Aroclor 1242	2.4	U	29	2.4	
12672-29-6	Aroclor 1248	2.4	U	29	2.4	
11097-69-1	**Aroclor 1254**	**25**	J	29	2.4	
11096-82-5	Aroclor 1260	2.4	U	29	2.4	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	113	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/04/2002
		Date Analyzed:	10/28/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-013	**Units:**	ug/Kg
Lab Code:	K2206977-015	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F040.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.15 g	**Column2:**	DB-XLB
% Solids:	52.6		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	1.6	U	19	1.6	
11104-28-2	Aroclor 1221	1.6	U	38	1.6	
11141-16-5	Aroclor 1232	1.6	U	19	1.6	
53469-21-9	Aroclor 1242	1.6	U	19	1.6	
12672-29-6	Aroclor 1248	1.6	U	19	1.6	
11097-69-1	Aroclor 1254	1.6	U	19	1.6	
11096-82-5	Aroclor 1260	1.6	U	19	1.6	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	107	57-149	10/28/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002
		Date Extracted:	10/14/2002
		Date Analyzed:	10/25/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-013 Dup	**Units:**	ug/Kg
Lab Code:	K2206977-017	**Basis:**	Dry
File ID:	J:\GC09\DATA\102402.B\1024F040.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0208089
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.09 g	**Column2:**	DB-XLB
% Solids:	54.9		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	1.5	U	9.1	1.5	
11104-28-2	Aroclor 1221	1.5	U	19	1.5	
11141-16-5	Aroclor 1232	1.5	U	9.1	1.5	
53469-21-9	Aroclor 1242	1.5	U	9.1	1.5	
12672-29-6	Aroclor 1248	1.5	U	9.1	1.5	
11097-69-1	Aroclor 1254	1.5	U	9.1	1.5	
11096-82-5	**Aroclor 1260**	**15**		9.1	1.5	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	111	57-149	10/25/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	10/04/2002
		Date Analyzed:	10/27/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0207751-6	**Basis:**	Dry
File ID:	J:\GC09\DATA\102702.B\1025F013.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0207751
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.00 g	**Column2:**	DB-XLB
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	0.82	U	10	0.82	
11104-28-2	Aroclor 1221	0.82	U	20	0.82	
11141-16-5	Aroclor 1232	0.82	U	10	0.82	
53469-21-9	Aroclor 1242	0.82	U	10	0.82	
12672-29-6	Aroclor 1248	0.82	U	10	0.82	
11097-69-1	Aroclor 1254	0.82	U	10	0.82	
11096-82-5	Aroclor 1260	0.82	U	10	0.82	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	108	57-149	10/27/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	10/14/2002
		Date Analyzed:	10/25/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0208089-4	**Basis:**	Dry
File ID:	J:\GC09\DATA\102402.B\1024F030.D	**Level:**	Low
Instrument ID:	GC09.i		
Extraction Method:	EPA 3540C	**Extraction Lot:**	KWG0208089
Analysis Method:	8082	**Calibration ID:**	CAL2036
		Column1:	DB-35MS
Sample Amount:	40.00 g	**Column2:**	DB-XLB
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	0.82	U	5.0	0.82	
11104-28-2	Aroclor 1221	0.82	U	10	0.82	
11141-16-5	Aroclor 1232	0.82	U	5.0	0.82	
53469-21-9	Aroclor 1242	0.82	U	5.0	0.82	
12672-29-6	Aroclor 1248	0.82	U	5.0	0.82	
11097-69-1	Aroclor 1254	0.82	U	5.0	0.82	
11096-82-5	Aroclor 1260	0.82	U	5.0	0.82	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	110	57-149	10/25/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Water	**Date Received:**	10/01/2002
		Date Extracted:	10/02/2002
		Date Analyzed:	10/20/2002

Polychlorinated Biphenyls (PCBs)

Sample Name:	SF-DODS-RB	**Units:**	ug/L
Lab Code:	K2206977-016	**Basis:**	NA
File ID:	J:\GC22\DATA\101902.B\1019F037.D	**Level:**	Low
Instrument ID:	GC22.i		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0207658
Analysis Method:	8082	**Calibration ID:**	CAL2107
		Column1:	DB-XLB
Sample Amount:	1020 ml	**Column2:**	DB-35MS
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	0.0066	U	0.020	0.0066	
11104-28-2	Aroclor 1221	0.0066	U	0.040	0.0066	
11141-16-5	Aroclor 1232	0.0066	U	0.020	0.0066	
53469-21-9	Aroclor 1242	0.0066	U	0.020	0.0066	
12672-29-6	Aroclor 1248	0.0066	U	0.020	0.0066	
11097-69-1	Aroclor 1254	0.0066	U	0.020	0.0066	
11096-82-5	Aroclor 1260	0.0066	U	0.020	0.0066	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	68	10-157	10/20/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Water

Service Request: K2206977
Date Collected: NA
Date Received: NA
Date Extracted: 10/02/2002
Date Analyzed: 10/19/2002

Polychlorinated Biphenyls (PCBs)

Sample Name: Method Blank
Lab Code: KWG0207658-4
File ID: J:\GC22\DATA\101902.B\1019F027.D
Instrument ID: GC22.i

Units: ug/L
Basis: NA
Level: Low

Extraction Method: EPA 3520C
Analysis Method: 8082

Extraction Lot: KWG0207658
Calibration ID: CAL2107

Column1: DB-XLB
Column2: DB-35MS

Sample Amount: 1000 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
12674-11-2	Aroclor 1016	0.0066	U	0.020	0.0066	
11104-28-2	Aroclor 1221	0.0066	U	0.040	0.0066	
11141-16-5	Aroclor 1232	0.0066	U	0.020	0.0066	
53469-21-9	Aroclor 1242	0.0066	U	0.020	0.0066	
12672-29-6	Aroclor 1248	0.0066	U	0.020	0.0066	
11097-69-1	Aroclor 1254	0.0066	U	0.020	0.0066	
11096-82-5	Aroclor 1260	0.0066	U	0.020	0.0066	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	91	10-157	10/19/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Water	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-RB	**Units:**	ug/L
Lab Code:	K2206977-016	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.019**	J	0.021	0.0033	1	10/03/02	10/15/02	KWG0207716	
2-Methylnaphthalene	ND	U	0.021	0.0028	1	10/03/02	10/15/02	KWG0207716	
Acenaphthylene	ND	U	0.021	0.0019	1	10/03/02	10/15/02	KWG0207716	
Acenaphthene	ND	U	0.021	0.0021	1	10/03/02	10/15/02	KWG0207716	
Dibenzofuran	ND	U	0.021	0.0074	1	10/03/02	10/15/02	KWG0207716	
Fluorene	ND	U	0.021	0.0027	1	10/03/02	10/15/02	KWG0207716	
Phenanthrene	ND	U	0.021	0.0034	1	10/03/02	10/15/02	KWG0207716	
Anthracene	**0.0012**	J	0.021	0.0011	1	10/03/02	10/15/02	KWG0207716	
Fluoranthene	**0.0026**	J	0.021	0.0025	1	10/03/02	10/15/02	KWG0207716	
Pyrene	**0.0026**	J	0.021	0.0024	1	10/03/02	10/15/02	KWG0207716	
Benz(a)anthracene	ND	U	0.021	0.0022	1	10/03/02	10/15/02	KWG0207716	
Chrysene	ND	U	0.021	0.0013	1	10/03/02	10/15/02	KWG0207716	
Benzo(b)fluoranthene	ND	U	0.021	0.0021	1	10/03/02	10/15/02	KWG0207716	
Benzo(k)fluoranthene	ND	U	0.021	0.0014	1	10/03/02	10/15/02	KWG0207716	
Benzo(a)pyrene	ND	U	0.021	0.0017	1	10/03/02	10/15/02	KWG0207716	
Indeno(1,2,3-cd)pyrene	ND	U	0.021	0.0022	1	10/03/02	10/15/02	KWG0207716	
Dibenz(a,h)anthracene	ND	U	0.021	0.0017	1	10/03/02	10/15/02	KWG0207716	
Benzo(g,h,i)perylene	ND	U	0.021	0.0039	1	10/03/02	10/15/02	KWG0207716	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	43-96	10/15/02	Acceptable
Fluoranthene-d10	85	20-131	10/15/02	Acceptable
Terphenyl-d14	92	13-146	10/15/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Water

Service Request: K2206977
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG0207716-4

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.020	0.0032	1	10/03/02	10/15/02	KWG0207716	
2-Methylnaphthalene	**0.0038**	J	0.020	0.0027	1	10/03/02	10/15/02	KWG0207716	
Acenaphthylene	ND	U	0.020	0.0018	1	10/03/02	10/15/02	KWG0207716	
Acenaphthene	ND	U	0.020	0.0020	1	10/03/02	10/15/02	KWG0207716	
Dibenzofuran	ND	U	0.020	0.0071	1	10/03/02	10/15/02	KWG0207716	
Fluorene	ND	U	0.020	0.0026	1	10/03/02	10/15/02	KWG0207716	
Phenanthrene	ND	U	0.020	0.0032	1	10/03/02	10/15/02	KWG0207716	
Anthracene	ND	U	0.020	0.0011	1	10/03/02	10/15/02	KWG0207716	
Fluoranthene	ND	U	0.020	0.0024	1	10/03/02	10/15/02	KWG0207716	
Pyrene	ND	U	0.020	0.0023	1	10/03/02	10/15/02	KWG0207716	
Benz(a)anthracene	ND	U	0.020	0.0021	1	10/03/02	10/15/02	KWG0207716	
Chrysene	ND	U	0.020	0.0013	1	10/03/02	10/15/02	KWG0207716	
Benzo(b)fluoranthene	ND	U	0.020	0.0020	1	10/03/02	10/15/02	KWG0207716	
Benzo(k)fluoranthene	ND	U	0.020	0.0014	1	10/03/02	10/15/02	KWG0207716	
Benzo(a)pyrene	ND	U	0.020	0.0016	1	10/03/02	10/15/02	KWG0207716	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0021	1	10/03/02	10/15/02	KWG0207716	
Dibenz(a,h)anthracene	ND	U	0.020	0.0017	1	10/03/02	10/15/02	KWG0207716	
Benzo(g,h,i)perylene	ND	U	0.020	0.0037	1	10/03/02	10/15/02	KWG0207716	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	45	43-96	10/15/02	Acceptable
Fluoranthene-d10	68	20-131	10/15/02	Acceptable
Terphenyl-d14	79	13-146	10/15/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-016	**Units:**	ug/Kg
Lab Code:	K2206977-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**2.5**	J	11	0.46	1	10/05/02	10/13/02	KWG0207798	
2-Methylnaphthalene	**2.6**	J	11	0.46	1	10/05/02	10/13/02	KWG0207798	
Acenaphthylene	ND	U	11	0.35	1	10/05/02	10/13/02	KWG0207798	
Acenaphthene	**0.73**	J	11	0.46	1	10/05/02	10/13/02	KWG0207798	
Dibenzofuran	**0.82**	J	11	0.44	1	10/05/02	10/13/02	KWG0207798	
Fluorene	**1.3**	J	11	0.37	1	10/05/02	10/13/02	KWG0207798	
Phenanthrene	**9.0**	J	11	0.33	1	10/05/02	10/13/02	KWG0207798	
Anthracene	**2.0**	J	11	0.41	1	10/05/02	10/13/02	KWG0207798	
Fluoranthene	**10**	J	11	0.37	1	10/05/02	10/13/02	KWG0207798	
Pyrene	**17**		11	0.24	1	10/05/02	10/13/02	KWG0207798	
Benz(a)anthracene	**4.1**	J	11	0.29	1	10/05/02	10/13/02	KWG0207798	
Chrysene	**6.0**	J	11	0.33	1	10/05/02	10/13/02	KWG0207798	
Benzo(b)fluoranthene	**6.4**	J	11	0.31	1	10/05/02	10/13/02	KWG0207798	
Benzo(k)fluoranthene	**5.5**	J	11	0.33	1	10/05/02	10/13/02	KWG0207798	
Benzo(a)pyrene	**8.2**	J	11	0.31	1	10/05/02	10/13/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**8.4**	J	11	0.33	1	10/05/02	10/13/02	KWG0207798	
Dibenz(a,h)anthracene	**0.71**	J	11	0.39	1	10/05/02	10/13/02	KWG0207798	
Benzo(g,h,i)perylene	**9.4**	J	11	0.22	1	10/05/02	10/13/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	55	43-98	10/13/02	Acceptable
Fluoranthene-d10	53	52-108	10/13/02	Acceptable
Terphenyl-d14	83	61-122	10/13/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-017	**Units:**	ug/Kg
Lab Code:	K2206977-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3.0**	J	9.1	0.38	1	10/05/02	10/13/02	KWG0207798	
2-Methylnaphthalene	**2.1**	J	9.1	0.38	1	10/05/02	10/13/02	KWG0207798	
Acenaphthylene	**0.60**	J	9.1	0.29	1	10/05/02	10/13/02	KWG0207798	
Acenaphthene	**0.73**	J	9.1	0.38	1	10/05/02	10/13/02	KWG0207798	
Dibenzofuran	**0.73**	J	9.1	0.37	1	10/05/02	10/13/02	KWG0207798	
Fluorene	**1.5**	J	9.1	0.31	1	10/05/02	10/13/02	KWG0207798	
Phenanthrene	**9.6**		9.1	0.28	1	10/05/02	10/13/02	KWG0207798	
Anthracene	**3.9**	J	9.1	0.35	1	10/05/02	10/13/02	KWG0207798	
Fluoranthene	**18**		9.1	0.31	1	10/05/02	10/13/02	KWG0207798	
Pyrene	**31**		9.1	0.20	1	10/05/02	10/13/02	KWG0207798	
Benz(a)anthracene	**8.0**	J	9.1	0.24	1	10/05/02	10/13/02	KWG0207798	
Chrysene	**12**		9.1	0.28	1	10/05/02	10/13/02	KWG0207798	
Benzo(b)fluoranthene	**13**		9.1	0.26	1	10/05/02	10/13/02	KWG0207798	
Benzo(k)fluoranthene	**11**		9.1	0.28	1	10/05/02	10/13/02	KWG0207798	
Benzo(a)pyrene	**16**		9.1	0.26	1	10/05/02	10/13/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**16**		9.1	0.28	1	10/05/02	10/13/02	KWG0207798	
Dibenz(a,h)anthracene	**1.4**	J	9.1	0.33	1	10/05/02	10/13/02	KWG0207798	
Benzo(g,h,i)perylene	**18**		9.1	0.19	1	10/05/02	10/13/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	43-98	10/13/02	Acceptable
Fluoranthene-d10	69	52-108	10/13/02	Acceptable
Terphenyl-d14	98	61-122	10/13/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-019	**Units:**	ug/Kg
Lab Code:	K2206977-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3.1**	J	14	0.56	1	10/17/02	10/24/02	KWG0208274	
2-Methylnaphthalene	**2.9**	J	14	0.56	1	10/17/02	10/24/02	KWG0208274	
Acenaphthylene	**0.63**	J	14	0.43	1	10/17/02	10/24/02	KWG0208274	
Acenaphthene	**1.9**	J	14	0.56	1	10/17/02	10/24/02	KWG0208274	
Dibenzofuran	**1.2**	J	14	0.54	1	10/17/02	10/24/02	KWG0208274	
Fluorene	**1.9**	J	14	0.46	1	10/17/02	10/24/02	KWG0208274	
Phenanthrene	**15**		14	0.40	1	10/17/02	10/24/02	KWG0208274	
Anthracene	**3.3**	J	14	0.51	1	10/17/02	10/24/02	KWG0208274	
Fluoranthene	**20**		14	0.46	1	10/17/02	10/24/02	KWG0208274	
Pyrene	**21**		14	0.30	1	10/17/02	10/24/02	KWG0208274	
Benz(a)anthracene	**5.5**	J	14	0.35	1	10/17/02	10/24/02	KWG0208274	
Chrysene	**6.9**	J	14	0.40	1	10/17/02	10/24/02	KWG0208274	
Benzo(b)fluoranthene	**8.3**	J	14	0.38	1	10/17/02	10/24/02	KWG0208274	
Benzo(k)fluoranthene	**5.2**	J	14	0.40	1	10/17/02	10/24/02	KWG0208274	
Benzo(a)pyrene	**11**	J	14	0.38	1	10/17/02	10/24/02	KWG0208274	
Indeno(1,2,3-cd)pyrene	**10**	J	14	0.40	1	10/17/02	10/24/02	KWG0208274	
Dibenz(a,h)anthracene	**1.0**	J	14	0.48	1	10/17/02	10/24/02	KWG0208274	
Benzo(g,h,i)perylene	**12**	J	14	0.27	1	10/17/02	10/24/02	KWG0208274	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	43-98	10/24/02	Acceptable
Fluoranthene-d10	72	52-108	10/24/02	Acceptable
Terphenyl-d14	68	61-122	10/24/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/22/2002
Date Received: 10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name: SF-DODS-020
Lab Code: K2206977-004

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	3.8	J	16	0.64	1	10/05/02	10/12/02	KWG0207798	
2-Methylnaphthalene	4.3	J	16	0.64	1	10/05/02	10/12/02	KWG0207798	
Acenaphthylene	0.75	J	16	0.49	1	10/05/02	10/12/02	KWG0207798	
Acenaphthene	0.66	J	16	0.64	1	10/05/02	10/12/02	KWG0207798	
Dibenzofuran	1.2	J	16	0.61	1	10/05/02	10/12/02	KWG0207798	
Fluorene	2.1	J	16	0.52	1	10/05/02	10/12/02	KWG0207798	
Phenanthrene	11	J	16	0.46	1	10/05/02	10/12/02	KWG0207798	
Anthracene	3.2	J	16	0.58	1	10/05/02	10/12/02	KWG0207798	
Fluoranthene	13	J	16	0.52	1	10/05/02	10/12/02	KWG0207798	
Pyrene	19		16	0.34	1	10/05/02	10/12/02	KWG0207798	
Benz(a)anthracene	5.9	J	16	0.40	1	10/05/02	10/12/02	KWG0207798	
Chrysene	7.1	J	16	0.46	1	10/05/02	10/12/02	KWG0207798	
Benzo(b)fluoranthene	8.5	J	16	0.43	1	10/05/02	10/12/02	KWG0207798	
Benzo(k)fluoranthene	5.2	J	16	0.46	1	10/05/02	10/12/02	KWG0207798	
Benzo(a)pyrene	11	J	16	0.43	1	10/05/02	10/12/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	9.3	J	16	0.46	1	10/05/02	10/12/02	KWG0207798	
Dibenz(a,h)anthracene	1.0	J	16	0.55	1	10/05/02	10/12/02	KWG0207798	
Benzo(g,h,i)perylene	9.3	J	16	0.31	1	10/05/02	10/12/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	43-98	10/12/02	Acceptable
Fluoranthene-d10	59	52-108	10/12/02	Acceptable
Terphenyl-d14	87	61-122	10/12/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-010	**Units:**	ug/Kg
Lab Code:	K2206977-005	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3.4**	J	12	0.51	1	10/05/02	10/12/02	KWG0207798	
2-Methylnaphthalene	**3.2**	J	12	0.51	1	10/05/02	10/12/02	KWG0207798	
Acenaphthylene	**0.74**	J	12	0.39	1	10/05/02	10/12/02	KWG0207798	
Acenaphthene	**0.56**	J	12	0.51	1	10/05/02	10/12/02	KWG0207798	
Dibenzofuran	**0.87**	J	12	0.48	1	10/05/02	10/12/02	KWG0207798	
Fluorene	**1.8**	J	12	0.41	1	10/05/02	10/12/02	KWG0207798	
Phenanthrene	**11**	J	12	0.36	1	10/05/02	10/12/02	KWG0207798	
Anthracene	**3.4**	J	12	0.46	1	10/05/02	10/12/02	KWG0207798	
Fluoranthene	**15**		12	0.41	1	10/05/02	10/12/02	KWG0207798	
Pyrene	**23**		12	0.27	1	10/05/02	10/12/02	KWG0207798	
Benz(a)anthracene	**7.1**	J	12	0.32	1	10/05/02	10/12/02	KWG0207798	
Chrysene	**8.9**	J	12	0.36	1	10/05/02	10/12/02	KWG0207798	
Benzo(b)fluoranthene	**9.8**	J	12	0.34	1	10/05/02	10/12/02	KWG0207798	
Benzo(k)fluoranthene	**7.8**	J	12	0.36	1	10/05/02	10/12/02	KWG0207798	
Benzo(a)pyrene	**13**		12	0.34	1	10/05/02	10/12/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**11**	J	12	0.36	1	10/05/02	10/12/02	KWG0207798	
Dibenz(a,h)anthracene	**1.1**	J	12	0.44	1	10/05/02	10/12/02	KWG0207798	
Benzo(g,h,i)perylene	**11**	J	12	0.24	1	10/05/02	10/12/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	55	43-98	10/12/02	Acceptable
Fluoranthene-d10	55	52-108	10/12/02	Acceptable
Terphenyl-d14	71	61-122	10/12/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-006	**Units:**	ug/Kg
Lab Code:	K2206977-006	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4.3**	J	15	0.60	1	10/05/02	10/13/02	KWG0207798	
2-Methylnaphthalene	**3.7**	J	15	0.60	1	10/05/02	10/13/02	KWG0207798	
Acenaphthylene	**0.81**	J	15	0.46	1	10/05/02	10/13/02	KWG0207798	
Acenaphthene	**0.75**	J	15	0.60	1	10/05/02	10/13/02	KWG0207798	
Dibenzofuran	**0.97**	J	15	0.57	1	10/05/02	10/13/02	KWG0207798	
Fluorene	**2.1**	J	15	0.49	1	10/05/02	10/13/02	KWG0207798	
Phenanthrene	**13**	J	15	0.43	1	10/05/02	10/13/02	KWG0207798	
Anthracene	**3.2**	J	15	0.55	1	10/05/02	10/13/02	KWG0207798	
Fluoranthene	**19**		15	0.49	1	10/05/02	10/13/02	KWG0207798	
Pyrene	**27**		15	0.32	1	10/05/02	10/13/02	KWG0207798	
Benz(a)anthracene	**9.5**	J	15	0.38	1	10/05/02	10/13/02	KWG0207798	
Chrysene	**16**		15	0.43	1	10/05/02	10/13/02	KWG0207798	
Benzo(b)fluoranthene	**18**		15	0.40	1	10/05/02	10/13/02	KWG0207798	
Benzo(k)fluoranthene	**16**		15	0.43	1	10/05/02	10/13/02	KWG0207798	
Benzo(a)pyrene	**19**		15	0.40	1	10/05/02	10/13/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**16**		15	0.43	1	10/05/02	10/13/02	KWG0207798	
Dibenz(a,h)anthracene	**1.8**	J	15	0.52	1	10/05/02	10/13/02	KWG0207798	
Benzo(g,h,i)perylene	**19**		15	0.29	1	10/05/02	10/13/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	58	43-98	10/13/02	Acceptable
Fluoranthene-d10	59	52-108	10/13/02	Acceptable
Terphenyl-d14	87	61-122	10/13/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-027	**Units:**	ug/Kg
Lab Code:	K2206977-007	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3.8**	J	14	0.55	1	10/05/02	10/13/02	KWG0207798	
2-Methylnaphthalene	**3.1**	J	14	0.55	1	10/05/02	10/13/02	KWG0207798	
Acenaphthylene	**0.82**	J	14	0.42	1	10/05/02	10/13/02	KWG0207798	
Acenaphthene	**0.73**	J	14	0.55	1	10/05/02	10/13/02	KWG0207798	
Dibenzofuran	**0.96**	J	14	0.53	1	10/05/02	10/13/02	KWG0207798	
Fluorene	**2.2**	J	14	0.45	1	10/05/02	10/13/02	KWG0207798	
Phenanthrene	**13**	J	14	0.40	1	10/05/02	10/13/02	KWG0207798	
Anthracene	**4.3**	J	14	0.50	1	10/05/02	10/13/02	KWG0207798	
Fluoranthene	**16**		14	0.45	1	10/05/02	10/13/02	KWG0207798	
Pyrene	**25**		14	0.29	1	10/05/02	10/13/02	KWG0207798	
Benz(a)anthracene	**6.8**	J	14	0.34	1	10/05/02	10/13/02	KWG0207798	
Chrysene	**10**	J	14	0.40	1	10/05/02	10/13/02	KWG0207798	
Benzo(b)fluoranthene	**13**	J	14	0.37	1	10/05/02	10/13/02	KWG0207798	
Benzo(k)fluoranthene	**7.2**	J	14	0.40	1	10/05/02	10/13/02	KWG0207798	
Benzo(a)pyrene	**13**	J	14	0.37	1	10/05/02	10/13/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**12**	J	14	0.40	1	10/05/02	10/13/02	KWG0207798	
Dibenz(a,h)anthracene	**1.2**	J	14	0.47	1	10/05/02	10/13/02	KWG0207798	
Benzo(g,h,i)perylene	**14**	J	14	0.27	1	10/05/02	10/13/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	43-98	10/13/02	Acceptable
Fluoranthene-d10	63	52-108	10/13/02	Acceptable
Terphenyl-d14	81	61-122	10/13/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-057	**Units:**	ug/Kg
Lab Code:	K2206977-008	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**2.8**	J	12	0.49	1	10/05/02	10/12/02	KWG0207798	
2-Methylnaphthalene	**3.4**	J	12	0.49	1	10/05/02	10/12/02	KWG0207798	
Acenaphthylene	ND	U	12	0.38	1	10/05/02	10/12/02	KWG0207798	
Acenaphthene	ND	U	12	0.49	1	10/05/02	10/12/02	KWG0207798	
Dibenzofuran	**0.71**	J	12	0.47	1	10/05/02	10/12/02	KWG0207798	
Fluorene	**1.7**	J	12	0.40	1	10/05/02	10/12/02	KWG0207798	
Phenanthrene	**8.7**	J	12	0.35	1	10/05/02	10/12/02	KWG0207798	
Anthracene	**0.94**	J	12	0.45	1	10/05/02	10/12/02	KWG0207798	
Fluoranthene	**8.0**	J	12	0.40	1	10/05/02	10/12/02	KWG0207798	
Pyrene	**11**	J	12	0.26	1	10/05/02	10/12/02	KWG0207798	
Benz(a)anthracene	**3.5**	J	12	0.31	1	10/05/02	10/12/02	KWG0207798	
Chrysene	**5.1**	J	12	0.35	1	10/05/02	10/12/02	KWG0207798	
Benzo(b)fluoranthene	**6.1**	J	12	0.33	1	10/05/02	10/12/02	KWG0207798	
Benzo(k)fluoranthene	**3.4**	J	12	0.35	1	10/05/02	10/12/02	KWG0207798	
Benzo(a)pyrene	**6.1**	J	12	0.33	1	10/05/02	10/12/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**5.5**	J	12	0.35	1	10/05/02	10/12/02	KWG0207798	
Dibenz(a,h)anthracene	**0.64**	J	12	0.42	1	10/05/02	10/12/02	KWG0207798	
Benzo(g,h,i)perylene	**6.6**	J	12	0.24	1	10/05/02	10/12/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	43-98	10/12/02	Acceptable
Fluoranthene-d10	76	52-108	10/12/02	Acceptable
Terphenyl-d14	97	61-122	10/12/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-092	**Units:**	ug/Kg
Lab Code:	K2206977-009	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.2**	J	18	0.75	1	10/05/02	10/13/02	KWG0207798	
2-Methylnaphthalene	**5.5**	J	18	0.75	1	10/05/02	10/13/02	KWG0207798	
Acenaphthylene	**0.83**	J	18	0.58	1	10/05/02	10/13/02	KWG0207798	
Acenaphthene	**0.80**	J	18	0.75	1	10/05/02	10/13/02	KWG0207798	
Dibenzofuran	**1.6**	J	18	0.72	1	10/05/02	10/13/02	KWG0207798	
Fluorene	**2.8**	J	18	0.61	1	10/05/02	10/13/02	KWG0207798	
Phenanthrene	**16**	J	18	0.54	1	10/05/02	10/13/02	KWG0207798	
Anthracene	**3.1**	J	18	0.68	1	10/05/02	10/13/02	KWG0207798	
Fluoranthene	**18**		18	0.61	1	10/05/02	10/13/02	KWG0207798	
Pyrene	**30**		18	0.40	1	10/05/02	10/13/02	KWG0207798	
Benz(a)anthracene	**7.5**	J	18	0.47	1	10/05/02	10/13/02	KWG0207798	
Chrysene	**12**	J	18	0.54	1	10/05/02	10/13/02	KWG0207798	
Benzo(b)fluoranthene	**14**	J	18	0.50	1	10/05/02	10/13/02	KWG0207798	
Benzo(k)fluoranthene	**9.1**	J	18	0.54	1	10/05/02	10/13/02	KWG0207798	
Benzo(a)pyrene	**15**	J	18	0.50	1	10/05/02	10/13/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**14**	J	18	0.54	1	10/05/02	10/13/02	KWG0207798	
Dibenz(a,h)anthracene	**1.4**	J	18	0.65	1	10/05/02	10/13/02	KWG0207798	
Benzo(g,h,i)perylene	**18**	J	18	0.36	1	10/05/02	10/13/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	52	43-98	10/13/02	Acceptable
Fluoranthene-d10	54	52-108	10/13/02	Acceptable
Terphenyl-d14	91	61-122	10/13/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-050	**Units:**	ug/Kg
Lab Code:	K2206977-010	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.2**	J	16	0.64	1	10/17/02	10/25/02	KWG0208274	
2-Methylnaphthalene	**6.0**	J	16	0.64	1	10/17/02	10/25/02	KWG0208274	
Acenaphthylene	**3.0**	J	16	0.49	1	10/17/02	10/25/02	KWG0208274	
Acenaphthene	**3.3**	J	16	0.64	1	10/17/02	10/25/02	KWG0208274	
Dibenzofuran	**7.6**	J	16	0.61	1	10/17/02	10/25/02	KWG0208274	
Fluorene	**8.5**	J	16	0.52	1	10/17/02	10/25/02	KWG0208274	
Phenanthrene	**22**		16	0.46	1	10/17/02	10/25/02	KWG0208274	
Anthracene	**9.5**	J	16	0.58	1	10/17/02	10/25/02	KWG0208274	
Fluoranthene	**24**		16	0.52	1	10/17/02	10/25/02	KWG0208274	
Pyrene	**26**		16	0.34	1	10/17/02	10/25/02	KWG0208274	
Benz(a)anthracene	**7.2**	J	16	0.40	1	10/17/02	10/25/02	KWG0208274	
Chrysene	**11**	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Benzo(b)fluoranthene	**13**	J	16	0.43	1	10/17/02	10/25/02	KWG0208274	
Benzo(k)fluoranthene	**7.8**	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Benzo(a)pyrene	**17**		16	0.43	1	10/17/02	10/25/02	KWG0208274	
Indeno(1,2,3-cd)pyrene	**14**	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Dibenz(a,h)anthracene	**1.5**	J	16	0.55	1	10/17/02	10/25/02	KWG0208274	
Benzo(g,h,i)perylene	**18**		16	0.31	1	10/17/02	10/25/02	KWG0208274	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	43-98	10/25/02	Acceptable
Fluoranthene-d10	68	52-108	10/25/02	Acceptable
Terphenyl-d14	66	61-122	10/25/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/25/2002
Date Received: 10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name: SF-DODS-116
Lab Code: K2206977-011

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	3.5	J	16	0.65	1	10/17/02	10/25/02	KWG0208274	
2-Methylnaphthalene	3.7	J	16	0.65	1	10/17/02	10/25/02	KWG0208274	
Acenaphthylene	0.65	J	16	0.49	1	10/17/02	10/25/02	KWG0208274	
Acenaphthene	0.66	J	16	0.65	1	10/17/02	10/25/02	KWG0208274	
Dibenzofuran	1.4	J	16	0.62	1	10/17/02	10/25/02	KWG0208274	
Fluorene	2.5	J	16	0.52	1	10/17/02	10/25/02	KWG0208274	
Phenanthrene	14	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Anthracene	2.4	J	16	0.59	1	10/17/02	10/25/02	KWG0208274	
Fluoranthene	15	J	16	0.52	1	10/17/02	10/25/02	KWG0208274	
Pyrene	16		16	0.34	1	10/17/02	10/25/02	KWG0208274	
Benz(a)anthracene	5.7	J	16	0.40	1	10/17/02	10/25/02	KWG0208274	
Chrysene	7.8	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Benzo(b)fluoranthene	8.7	J	16	0.43	1	10/17/02	10/25/02	KWG0208274	
Benzo(k)fluoranthene	5.3	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Benzo(a)pyrene	11	J	16	0.43	1	10/17/02	10/25/02	KWG0208274	
Indeno(1,2,3-cd)pyrene	9.1	J	16	0.46	1	10/17/02	10/25/02	KWG0208274	
Dibenz(a,h)anthracene	0.97	J	16	0.56	1	10/17/02	10/25/02	KWG0208274	
Benzo(g,h,i)perylene	11	J	16	0.31	1	10/17/02	10/25/02	KWG0208274	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	43-98	10/25/02	Acceptable
Fluoranthene-d10	75	52-108	10/25/02	Acceptable
Terphenyl-d14	64	61-122	10/25/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-064	**Units:**	ug/Kg
Lab Code:	K2206977-012	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4.3**	J	17	0.69	1	10/05/02	10/14/02	KWG0207798	
2-Methylnaphthalene	**4.7**	J	17	0.69	1	10/05/02	10/14/02	KWG0207798	
Acenaphthylene	**0.58**	J	17	0.53	1	10/05/02	10/14/02	KWG0207798	
Acenaphthene	ND	U	17	0.69	1	10/05/02	10/14/02	KWG0207798	
Dibenzofuran	**1.2**	J	17	0.66	1	10/05/02	10/14/02	KWG0207798	
Fluorene	**2.2**	J	17	0.56	1	10/05/02	10/14/02	KWG0207798	
Phenanthrene	**13**	J	17	0.50	1	10/05/02	10/14/02	KWG0207798	
Anthracene	**1.4**	J	17	0.63	1	10/05/02	10/14/02	KWG0207798	
Fluoranthene	**12**	J	17	0.56	1	10/05/02	10/14/02	KWG0207798	
Pyrene	**15**	J	17	0.37	1	10/05/02	10/14/02	KWG0207798	
Benz(a)anthracene	**4.4**	J	17	0.43	1	10/05/02	10/14/02	KWG0207798	
Chrysene	**7.1**	J	17	0.50	1	10/05/02	10/14/02	KWG0207798	
Benzo(b)fluoranthene	**7.5**	J	17	0.46	1	10/05/02	10/14/02	KWG0207798	
Benzo(k)fluoranthene	**4.4**	J	17	0.50	1	10/05/02	10/14/02	KWG0207798	
Benzo(a)pyrene	**8.1**	J	17	0.46	1	10/05/02	10/14/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**8.8**	J	17	0.50	1	10/05/02	10/14/02	KWG0207798	
Dibenz(a,h)anthracene	**1.6**	J	17	0.60	1	10/05/02	10/14/02	KWG0207798	
Benzo(g,h,i)perylene	**12**	J	17	0.33	1	10/05/02	10/14/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	52	43-98	10/14/02	Acceptable
Fluoranthene-d10	56	52-108	10/14/02	Acceptable
Terphenyl-d14	78	61-122	10/14/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-023	**Units:**	ug/Kg
Lab Code:	K2206977-013	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3.7**	J	14	0.57	1	10/05/02	10/14/02	KWG0207798	
2-Methylnaphthalene	**4.0**	J	14	0.57	1	10/05/02	10/14/02	KWG0207798	
Acenaphthylene	**0.53**	J	14	0.44	1	10/05/02	10/14/02	KWG0207798	
Acenaphthene	ND	U	14	0.57	1	10/05/02	10/14/02	KWG0207798	
Dibenzofuran	**1.1**	J	14	0.54	1	10/05/02	10/14/02	KWG0207798	
Fluorene	**1.9**	J	14	0.46	1	10/05/02	10/14/02	KWG0207798	
Phenanthrene	**11**	J	14	0.41	1	10/05/02	10/14/02	KWG0207798	
Anthracene	**1.8**	J	14	0.52	1	10/05/02	10/14/02	KWG0207798	
Fluoranthene	**11**	J	14	0.46	1	10/05/02	10/14/02	KWG0207798	
Pyrene	**13**	J	14	0.30	1	10/05/02	10/14/02	KWG0207798	
Benz(a)anthracene	**4.0**	J	14	0.35	1	10/05/02	10/14/02	KWG0207798	
Chrysene	**6.5**	J	14	0.41	1	10/05/02	10/14/02	KWG0207798	
Benzo(b)fluoranthene	**7.1**	J	14	0.38	1	10/05/02	10/14/02	KWG0207798	
Benzo(k)fluoranthene	**4.3**	J	14	0.41	1	10/05/02	10/14/02	KWG0207798	
Benzo(a)pyrene	**7.8**	J	14	0.38	1	10/05/02	10/14/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**8.5**	J	14	0.41	1	10/05/02	10/14/02	KWG0207798	
Dibenz(a,h)anthracene	**1.0**	J	14	0.49	1	10/05/02	10/14/02	KWG0207798	
Benzo(g,h,i)perylene	**11**	J	14	0.27	1	10/05/02	10/14/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	57	43-98	10/14/02	Acceptable
Fluoranthene-d10	67	52-108	10/14/02	Acceptable
Terphenyl-d14	79	61-122	10/14/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-114	**Units:**	ug/Kg
Lab Code:	K2206977-014	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3.5**	J	15	0.60	1	10/05/02	10/14/02	KWG0207798	
2-Methylnaphthalene	**4.1**	J	15	0.60	1	10/05/02	10/14/02	KWG0207798	
Acenaphthylene	ND	U	15	0.46	1	10/05/02	10/14/02	KWG0207798	
Acenaphthene	ND	U	15	0.60	1	10/05/02	10/14/02	KWG0207798	
Dibenzofuran	**1.1**	J	15	0.57	1	10/05/02	10/14/02	KWG0207798	
Fluorene	**2.0**	J	15	0.48	1	10/05/02	10/14/02	KWG0207798	
Phenanthrene	**8.5**	J	15	0.43	1	10/05/02	10/14/02	KWG0207798	
Anthracene	**5.2**	J	15	0.54	1	10/05/02	10/14/02	KWG0207798	
Fluoranthene	**7.1**	J	15	0.48	1	10/05/02	10/14/02	KWG0207798	
Pyrene	**8.2**	J	15	0.31	1	10/05/02	10/14/02	KWG0207798	
Benz(a)anthracene	**2.7**	J	15	0.37	1	10/05/02	10/14/02	KWG0207798	
Chrysene	**4.5**	J	15	0.43	1	10/05/02	10/14/02	KWG0207798	
Benzo(b)fluoranthene	**5.3**	J	15	0.40	1	10/05/02	10/14/02	KWG0207798	
Benzo(k)fluoranthene	**2.1**	J	15	0.43	1	10/05/02	10/14/02	KWG0207798	
Benzo(a)pyrene	**4.0**	J	15	0.40	1	10/05/02	10/14/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**4.8**	J	15	0.43	1	10/05/02	10/14/02	KWG0207798	
Dibenz(a,h)anthracene	**0.69**	J	15	0.51	1	10/05/02	10/14/02	KWG0207798	
Benzo(g,h,i)perylene	**6.9**	J	15	0.29	1	10/05/02	10/14/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	43-98	10/14/02	Acceptable
Fluoranthene-d10	69	52-108	10/14/02	Acceptable
Terphenyl-d14	84	61-122	10/14/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-013	**Units:**	ug/Kg
Lab Code:	K2206977-015	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4.7**	J	9.5	0.40	1	10/05/02	10/14/02	KWG0207798	
2-Methylnaphthalene	**1.5**	J	9.5	0.40	1	10/05/02	10/14/02	KWG0207798	
Acenaphthylene	**1.6**	J	9.5	0.31	1	10/05/02	10/14/02	KWG0207798	
Acenaphthene	**2.2**	J	9.5	0.40	1	10/05/02	10/14/02	KWG0207798	
Dibenzofuran	**0.72**	J	9.5	0.39	1	10/05/02	10/14/02	KWG0207798	
Fluorene	**1.8**	J	9.5	0.33	1	10/05/02	10/14/02	KWG0207798	
Phenanthrene	**23**		9.5	0.29	1	10/05/02	10/14/02	KWG0207798	
Anthracene	**5.7**	J	9.5	0.37	1	10/05/02	10/14/02	KWG0207798	
Fluoranthene	**58**		9.5	0.33	1	10/05/02	10/14/02	KWG0207798	
Pyrene	**78**		9.5	0.21	1	10/05/02	10/14/02	KWG0207798	
Benz(a)anthracene	**23**		9.5	0.25	1	10/05/02	10/14/02	KWG0207798	
Chrysene	**31**		9.5	0.29	1	10/05/02	10/14/02	KWG0207798	
Benzo(b)fluoranthene	**31**		9.5	0.27	1	10/05/02	10/14/02	KWG0207798	
Benzo(k)fluoranthene	**26**		9.5	0.29	1	10/05/02	10/14/02	KWG0207798	
Benzo(a)pyrene	**43**		9.5	0.27	1	10/05/02	10/14/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	**37**		9.5	0.29	1	10/05/02	10/14/02	KWG0207798	
Dibenz(a,h)anthracene	**3.6**	J	9.5	0.35	1	10/05/02	10/14/02	KWG0207798	
Benzo(g,h,i)perylene	**43**		9.5	0.20	1	10/05/02	10/14/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	55	43-98	10/14/02	Acceptable
Fluoranthene-d10	53	52-108	10/14/02	Acceptable
Terphenyl-d14	80	61-122	10/14/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Polynuclear Aromatic Hydrocarbons

Sample Name:	SF-DODS-013 Dup	**Units:**	ug/Kg
Lab Code:	K2206977-017	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.5**	J	9.1	0.39	1	10/14/02	10/22/02	KWG0208116	
2-Methylnaphthalene	**2.5**	J	9.1	0.39	1	10/14/02	10/22/02	KWG0208116	
Acenaphthylene	**3.2**	J	9.1	0.30	1	10/14/02	10/22/02	KWG0208116	
Acenaphthene	**2.4**	J	9.1	0.39	1	10/14/02	10/22/02	KWG0208116	
Dibenzofuran	**1.3**	J	9.1	0.37	1	10/14/02	10/22/02	KWG0208116	
Fluorene	**3.1**	J	9.1	0.31	1	10/14/02	10/22/02	KWG0208116	
Phenanthrene	**33**		9.1	0.28	1	10/14/02	10/22/02	KWG0208116	
Anthracene	**12**		9.1	0.35	1	10/14/02	10/22/02	KWG0208116	
Fluoranthene	**87**		9.1	0.31	1	10/14/02	10/22/02	KWG0208116	
Pyrene	**120**		9.1	0.21	1	10/14/02	10/22/02	KWG0208116	
Benz(a)anthracene	**39**		9.1	0.24	1	10/14/02	10/22/02	KWG0208116	
Chrysene	**43**		9.1	0.28	1	10/14/02	10/22/02	KWG0208116	
Benzo(b)fluoranthene	**50**		9.1	0.26	1	10/14/02	10/22/02	KWG0208116	
Benzo(k)fluoranthene	**34**		9.1	0.28	1	10/14/02	10/22/02	KWG0208116	
Benzo(a)pyrene	**75**		9.1	0.26	1	10/14/02	10/22/02	KWG0208116	
Indeno(1,2,3-cd)pyrene	**55**		9.1	0.28	1	10/14/02	10/22/02	KWG0208116	
Dibenz(a,h)anthracene	**5.4**	J	9.1	0.33	1	10/14/02	10/22/02	KWG0208116	
Benzo(g,h,i)perylene	**53**		9.1	0.19	1	10/14/02	10/22/02	KWG0208116	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	58	43-98	10/22/02	Acceptable
Fluoranthene-d10	64	52-108	10/22/02	Acceptable
Terphenyl-d14	79	61-122	10/22/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG0207798-5

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.23**	J	5.0	0.21	1	10/05/02	10/12/02	KWG0207798	
2-Methylnaphthalene	ND	U	5.0	0.21	1	10/05/02	10/12/02	KWG0207798	
Acenaphthylene	ND	U	5.0	0.16	1	10/05/02	10/12/02	KWG0207798	
Acenaphthene	ND	U	5.0	0.21	1	10/05/02	10/12/02	KWG0207798	
Dibenzofuran	ND	U	5.0	0.20	1	10/05/02	10/12/02	KWG0207798	
Fluorene	ND	U	5.0	0.17	1	10/05/02	10/12/02	KWG0207798	
Phenanthrene	ND	U	5.0	0.15	1	10/05/02	10/12/02	KWG0207798	
Anthracene	ND	U	5.0	0.19	1	10/05/02	10/12/02	KWG0207798	
Fluoranthene	ND	U	5.0	0.17	1	10/05/02	10/12/02	KWG0207798	
Pyrene	ND	U	5.0	0.11	1	10/05/02	10/12/02	KWG0207798	
Benz(a)anthracene	ND	U	5.0	0.13	1	10/05/02	10/12/02	KWG0207798	
Chrysene	ND	U	5.0	0.15	1	10/05/02	10/12/02	KWG0207798	
Benzo(b)fluoranthene	ND	U	5.0	0.14	1	10/05/02	10/12/02	KWG0207798	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	10/05/02	10/12/02	KWG0207798	
Benzo(a)pyrene	ND	U	5.0	0.14	1	10/05/02	10/12/02	KWG0207798	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.15	1	10/05/02	10/12/02	KWG0207798	
Dibenz(a,h)anthracene	ND	U	5.0	0.18	1	10/05/02	10/12/02	KWG0207798	
Benzo(g,h,i)perylene	ND	U	5.0	0.10	1	10/05/02	10/12/02	KWG0207798	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	79	43-98	10/12/02	Acceptable
Fluoranthene-d10	83	52-108	10/12/02	Acceptable
Terphenyl-d14	122	61-122	10/12/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Soil

Service Request: K2206977
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG0208116-9

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	5.0	0.21	1	10/14/02	10/15/02	KWG0208116	
2-Methylnaphthalene	ND	U	5.0	0.21	1	10/14/02	10/15/02	KWG0208116	
Acenaphthylene	ND	U	5.0	0.16	1	10/14/02	10/15/02	KWG0208116	
Acenaphthene	ND	U	5.0	0.21	1	10/14/02	10/15/02	KWG0208116	
Dibenzofuran	ND	U	5.0	0.20	1	10/14/02	10/15/02	KWG0208116	
Fluorene	ND	U	5.0	0.17	1	10/14/02	10/15/02	KWG0208116	
Phenanthrene	ND	U	5.0	0.15	1	10/14/02	10/15/02	KWG0208116	
Anthracene	ND	U	5.0	0.19	1	10/14/02	10/15/02	KWG0208116	
Fluoranthene	ND	U	5.0	0.17	1	10/14/02	10/15/02	KWG0208116	
Pyrene	ND	U	5.0	0.11	1	10/14/02	10/15/02	KWG0208116	
Benz(a)anthracene	ND	U	5.0	0.13	1	10/14/02	10/15/02	KWG0208116	
Chrysene	ND	U	5.0	0.15	1	10/14/02	10/15/02	KWG0208116	
Benzo(b)fluoranthene	ND	U	5.0	0.14	1	10/14/02	10/15/02	KWG0208116	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	10/14/02	10/15/02	KWG0208116	
Benzo(a)pyrene	ND	U	5.0	0.14	1	10/14/02	10/15/02	KWG0208116	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.15	1	10/14/02	10/15/02	KWG0208116	
Dibenz(a,h)anthracene	ND	U	5.0	0.18	1	10/14/02	10/15/02	KWG0208116	
Benzo(g,h,i)perylene	ND	U	5.0	0.10	1	10/14/02	10/15/02	KWG0208116	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	79	43-98	10/15/02	Acceptable
Fluoranthene-d10	85	52-108	10/15/02	Acceptable
Terphenyl-d14	102	61-122	10/15/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0208274-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.25**	J	5.0	0.21	1	10/17/02	10/24/02	KWG0208274	
2-Methylnaphthalene	ND	U	5.0	0.21	1	10/17/02	10/24/02	KWG0208274	
Acenaphthylene	ND	U	5.0	0.16	1	10/17/02	10/24/02	KWG0208274	
Acenaphthene	ND	U	5.0	0.21	1	10/17/02	10/24/02	KWG0208274	
Dibenzofuran	ND	U	5.0	0.20	1	10/17/02	10/24/02	KWG0208274	
Fluorene	ND	U	5.0	0.17	1	10/17/02	10/24/02	KWG0208274	
Phenanthrene	ND	U	5.0	0.15	1	10/17/02	10/24/02	KWG0208274	
Anthracene	ND	U	5.0	0.19	1	10/17/02	10/24/02	KWG0208274	
Fluoranthene	ND	U	5.0	0.17	1	10/17/02	10/24/02	KWG0208274	
Pyrene	**0.12**	J	5.0	0.11	1	10/17/02	10/24/02	KWG0208274	
Benz(a)anthracene	**0.25**	J	5.0	0.13	1	10/17/02	10/24/02	KWG0208274	
Chrysene	ND	U	5.0	0.15	1	10/17/02	10/24/02	KWG0208274	
Benzo(b)fluoranthene	ND	U	5.0	0.14	1	10/17/02	10/24/02	KWG0208274	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	10/17/02	10/24/02	KWG0208274	
Benzo(a)pyrene	ND	U	5.0	0.14	1	10/17/02	10/24/02	KWG0208274	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.15	1	10/17/02	10/24/02	KWG0208274	
Dibenz(a,h)anthracene	ND	U	5.0	0.18	1	10/17/02	10/24/02	KWG0208274	
Benzo(g,h,i)perylene	**0.14**	J	5.0	0.10	1	10/17/02	10/24/02	KWG0208274	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	43-98	10/24/02	Acceptable
Fluoranthene-d10	82	52-108	10/24/02	Acceptable
Terphenyl-d14	87	61-122	10/24/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Water	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-RB	**Units:**	ug/L
Lab Code:	K2206977-016	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	0.020	0.0062	1	10/01/02	10/11/02	KWG0207645	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	78	41-128	10/11/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Butyltins

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0207645-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	0.010	0.0062	1	10/01/02	10/11/02	KWG0207645	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	79	41-128	10/11/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-016	**Units:**	ug/Kg
Lab Code:	K2206977-001	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.2	0.78	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	81	22-113	10/15/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/21/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-017	**Units:**	ug/Kg
Lab Code:	K2206977-002	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**1.0**	J	1.8	0.65	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	87	22-113	10/15/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-019	**Units:**	ug/Kg
Lab Code:	K2206977-003	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.7	0.96	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	81	22-113	10/15/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-020	**Units:**	ug/Kg
Lab Code:	K2206977-004	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	3.1	1.1	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	82	22-113	10/15/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-010	**Units:**	ug/Kg
Lab Code:	K2206977-005	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.4	0.87	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	72	22-113	10/15/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/22/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-006	**Units:**	ug/Kg
Lab Code:	K2206977-006	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.9	1.1	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	86	22-113	10/15/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-027	**Units:**	ug/Kg
Lab Code:	K2206977-007	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.6	0.94	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	70	22-113	10/30/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/23/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-057	**Units:**	ug/Kg
Lab Code:	K2206977-008	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.4	0.84	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	70	22-113	10/30/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-092	**Units:**	ug/Kg
Lab Code:	K2206977-009	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	3.6	1.3	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	74	22-113	10/30/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/24/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-050	**Units:**	ug/Kg
Lab Code:	K2206977-010	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	3.1	1.1	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	67	22-113	10/30/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/25/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-116	**Units:**	ug/Kg
Lab Code:	K2206977-011	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	3.1	1.2	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	70	22-113	10/30/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/25/2002
Date Received: 10/01/2002

Butyltins

Sample Name: SF-DODS-064
Lab Code: K2206977-012

Units: ug/Kg
Basis: Dry

Extraction Method: METHOD
Analysis Method: Krone

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	3.3	1.2	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	75	22-113	10/30/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/26/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-023	**Units:**	ug/Kg
Lab Code:	K2206977-013	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.7	0.97	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	65	22-113	10/30/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/27/2002
Date Received: 10/01/2002

Butyltins

Sample Name: SF-DODS-114
Lab Code: K2206977-014

Extraction Method: METHOD
Analysis Method: Krone

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	2.9	1.1	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	72	22-113	10/30/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	09/27/2002
Sample Matrix:	Sediment	**Date Received:**	10/01/2002

Butyltins

Sample Name:	SF-DODS-013	**Units:**	ug/Kg
Lab Code:	K2206977-015	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**4.2**		1.9	0.69	1	10/07/02	10/30/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	66	22-113	10/30/02	Acceptable

Comments:

Client: Science Applications
Project: SF-DODS Sea Floor Monitoring/SF-DODS
Sample Matrix: Sediment

Service Request: K2206977
Date Collected: 09/27/2002
Date Received: 10/01/2002

Butyltins

Sample Name: SF-DODS-013 Dup
Lab Code: K2206977-017

Extraction Method: METHOD
Analysis Method: Krone

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	**25**		1.8	0.66	1	10/16/02	10/30/02	KWG0208233	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	67	22-113	10/30/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Butyltins

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0207783-4	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	1.0	0.36	1	10/04/02	10/15/02	KWG0207783	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	74	22-113	10/15/02	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Butyltins

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0207856-4	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	1.0	0.36	1	10/07/02	10/29/02	KWG0207856	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	52	22-113	10/29/02	Acceptable

Comments:

Client:	Science Applications	**Service Request:**	K2206977
Project:	SF-DODS Sea Floor Monitoring/SF-DODS	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Butyltins

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0208233-4	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tri-n-butyltin	ND	U	1.0	0.36	1	10/16/02	10/30/02	KWG0208233	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	28	22-113	10/30/02	Acceptable

Comments:

APPENDIX C

Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Aberranta sp. 1	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
Acanthomunna sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Acanthomunna sp. 2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Aceroides sp. 1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Acharax johnsoni	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Acteonidae sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Adontorhina lynnae	7	1	0	22	7	3	3	1	3	13	12	0	3	5	4
Agathotanais sp. 1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Aglaophamus paucilamellata	0	1	0	0	0	0	0	0	0	2	1	1	0	2	0
Akanthophoreinae sp. 6	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Akanthophoreinae sp. 7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ampelisca catalinenesis	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Ampelisca plumosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ampelisca sp. 1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Ampeliscidae spp. indet.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Ampharete finmarchica	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Ampharetidae sp. 1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ampharetidae sp. 3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ampharetidae sp. 4	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Ampharetidae spp. indet.	1	2	0	11	4	1	0	1	3	58	9	1	0	1	2
Amphicteis mucronata	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Amphicteis vestis	0	0	0	0	0	0	0	0	0	15	0	0	0	2	0
Amphipoda spp. indet.	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Amphitritinae sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Amphitritinae sp. 3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Amphiura caracha	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Amphiura diomedeae	0	4	2	1	2	5	2	3	1	1	0	0	2	0	4
Anarthruridae spp. indet.	1	0	0	0	0	5	0	0	0	2	0	0	0	0	1
Anarthrurinae sp. 1	3	8	0	2	4	1	2	9	9	0	1	0	3	0	0
Anarthrurinae sp. 2	1	7	0	9	3	29	1	9	3	8	1	0	7	0	0
Anarthrurinae sp. 4	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0
Anarthrurinae sp. 6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Anarthrurinae sp. 8	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
Anchidorvillea moniliformis	0	0	0	0	0	0	0	1	2	1	0	0	0	0	1
Ancistrosyllis groenlandica	3	3	0	1	2	2	6	0	4	1	0	2	3	2	6
Anemone spp. indet.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Anobothrus gracilis	0	4	0	15	3	1	4	2	2	14	2	3	0	3	0
Anobothrus sp. 2	0	0	0	0	0	0	0	0	0	9	0	0	0	3	0
Anobothrus sp. 3	0	0	0	0	0	0	0	0	0	27	1	0	0	6	0
Aphelochaeta cf. glandaria	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Aphelochaeta nr. monilaris	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Aphelochaeta sp. 1	5	9	0	4	10	2	3	4	13	2	5	2	3	7	3
Aphelochaeta sp. 10	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Aphelochaeta sp. 2	2	1	2	5	2	1	0	0	0	0	0	0	0	3	0
Aphelochaeta sp. 7	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0
Aphelochaeta sp. 8	2	0	0	13	11	1	0	3	2	0	8	0	2	1	0

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Aphelochaeta sp. 9	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Aphroditidae spp. indet.	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Apistobranchus ornatus	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0
Araphura sp. 2	19	2	0	5	2	1	0	1	1	1	3	0	4	3	22
Argissa sp. 1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Aricidea cf. hartleyi	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Aricidea cf. pseudoarticulata	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Aricidea quadrilobata	1	0	1	0	0	1	0	0	0	1	1	0	0	0	0
Aricidea ramosa	3	0	0	1	3	0	0	0	2	4	1	0	0	0	0
Aricidea simplex	51	15	2	194	32	3	2	0	2	20	58	1	5	160	1
Aricidea simplex - type 2	14	1	0	24	1	0	3	0	0	14	5	0	0	0	1
Aricidea sp. 1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Aricidea sp. 12	0	0	0	11	3	0	0	0	0	0	0	1	0	0	0
Aricidea sp. 14	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Aricidea sp. 3	0	15	2	3	8	8	12	11	12	0	5	21	5	3	7
Aricidea sp. 4	0	20	2	23	7	0	0	10	9	48	16	1	18	17	10
Aricidea sp. 5	44	2	1	19	14	4	2	3	0	0	16	1	0	10	4
Aricidea wassi	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asclerocheilus beringianus	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Asclerocheilus sp. 4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Atlantocuma (?) sp. 1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Aurospio dibranchiata	0	0	0	1	0	0	1	0	1	8	0	0	0	2	0
Austrotindaria gibbsi	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0
Axinopsida sp. 1 (2002)	11	12	3	6	16	11	3	8	0	9	3	3	3	0	25
Bathyarca nucleator	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0
Bathybadistes sp. 1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Bathyglycinde cedroensis	2	1	1	0	1	0	0	0	0	1	0	0	1	0	1
Bathymedon flebilis	0	1	0	0	0	0	1	0	0	4	0	0	1	0	0
Bathymedon nr. saussurei	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Bathymedon sp. 1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Bathynearera tillamookensis	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Betamorpha cf. magista	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bivalvia spp. indet.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5
Bonnierella lineraris	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
Brada pilosa	1	0	0	0	2	0	0	1	0	0	0	0	0	0	0
Brada pleurobranchiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Braniella palpata	1	4	0	0	6	3	4	1	3	0	0	7	0	0	4
Braniella sp. 1	0	7	0	10	1	1	2	9	7	0	5	3	3	2	6
Bruzelia tuberculata	2	0	0	0	1	2	0	0	1	0	4	0	0	0	1
Byblis nr. crassicornis	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0
Campylaspis sp. 1	1	0	0	0	2	0	0	0	1	0	0	0	0	0	0
Campylaspis sp. 2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Campylaspis sp. 3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Capitellidae n. gen. n. sp. 1	0	0	5	0	0	0	0	0	1	0	0	0	0	0	1
Capitellidae spp. indet.	0	3	0	4	2	3	2	1	0	7	0	1	2	2	1
Caprellidae (nr. Leuconacia) sp. 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Carpoapseudes sp. 1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ceratocephale pacifica	2	0	1	10	3	1	0	1	2	3	4	0	0	4	0
Cerebratulus sp. 1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
cf. Notoxenoides sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chaetodermamorpha spp.	47	50	8	26	37	70	42	54	54	27	13	66	52	0	86
Chaetoparia careyi	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Chaetozone sp. 1	34	16	18	19	47	10	1	3	5	0	0	5	30	1	19
Chaetozone sp. 4	0	32	0	12	20	20	7	11	24	5	5	26	10	0	17
Chaetozone sp. 6	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
Chaetozone sp. 8	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0
Chaetozone spinosa	9	9	25	12	26	18	8	11	13	0	7	2	10	0	4
Chelator sp. 1	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0
Chelator sp. 2	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0
Chelator sp. 3	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Cirratulidae spp. indet.	11	16	2	14	3	1	3	2	0	40	1	17	1	4	3
Cirrophorus branchiatus	0	0	1	4	1	0	0	0	0	0	0	0	0	0	0
Cirrophorus furcatus	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0
Clavodorum sp. 2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Clymenura gracilis	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0
Clymenura sp. 1	2	0	0	9	5	0	0	2	3	4	7	0	0	0	0
Colus cf. glyptis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Colus cf. jordani	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cossura brunnea	0	5	6	2	0	2	0	3	4	0	1	4	3	1	0
Cossura modica	16	10	9	18	8	4	13	17	27	0	11	4	16	0	14
Cossura pygodactylata	0	5	2	1	2	0	0	0	0	22	2	3	1	0	0
Cossura rostrata	22	22	13	50	7	30	14	43	12	49	10	8	17	1	26
Cryptocope sp. 2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cumacea spp. indet.	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Cyclopectin bistriatus	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Deminucula nr. atacellana	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0
Dendrotion sp. 1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Desmosoma sp. 1	0	0	0	0	0	0	0	0	0	5	6	4	0	3	0
Desmosoma sp. 2	0	0	0	0	0	0	0	0	0	4	0	0	0	1	1
Desmosomatidae spp. indet.	1	0	0	1	0	0	0	0	1	1	5	0	1	3	0
Diplocirrus sp. 1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Diplocirrus sp. 3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Disconectes sp. 2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dorvilleidae spp. indet.	0	1	4	0	2	2	1	1	0	6	0	1	1	0	1
Drilonereis falcata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysponetus sp. 1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	1
Echinoidea spp. indet.	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0
Echiura sp. 1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Echiura sp. 2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsia sp. 1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Edwardsia sp. 2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Edwardsia sp. 3	0	0	0	1	0	1	0	0	0	0	3	1	0	0	0

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Edwardsiidae spp. indet.	0	0	0	1	0	0	1	2	0	0	2	0	0	0	1
Ehlersileanira sp. 1	7	2	0	1	0	0	1	3	8	0	1	4	5	0	6
Ehlersileanira sp. 2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Elutheromenia ? sp.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Eranno sp. 1	0	0	0	1	0	0	0	0	0	16	3	1	0	1	0
Euchone velifera	2	0	1	1	5	0	0	1	0	1	1	0	0	3	1
Euclymene sp. 1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Eudorella sp. 1	0	1	0	0	0	0	0	0	0	8	0	0	0	0	0
Eudorella sp. 2	0	0	1	0	0	0	1	1	1	0	3	2	0	0	0
Eugerda sp. 1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Eugerda sp. 4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Eugerda sp. 5	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
Eugerda sp. 6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Eugerdella cf. pugilator	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Eugerdella sp. 1	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0
Eulalia sp. 1	0	1	0	1	1	1	0	0	0	0	1	0	0	0	2
Exallopus intermedius	0	0	0	0	0	1	0	0	3	1	0	0	0	1	0
Exallopus sp. 1	0	0	0	0	0	1	1	1	0	2	0	1	0	0	1
Exliniscus sp. 1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Exliniscus sp. 2	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Fauveliopsis glabra	2	0	0	1	3	1	1	3	2	0	0	0	0	0	0
Flabelligella sp. 1	0	2	1	2	2	6	1	0	0	10	1	1	0	1	8
Flabelligera sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Flabelligeridae spp. indet.	4	3	0	5	6	0	0	0	1	6	0	0	1	4	2
Galathowenia pygidialis	9	1	0	1	3	0	0	1	0	2	0	0	0	2	0
Gastropoda spp. indet.	0	0	0	2	1	1	0	0	0	0	0	0	1	0	2
Genitoconia sp. ?	0	0	0	0	1	0	0	0	3	5	0	0	0	0	0
Glycera americana	0	0	0	0	0	0	0	3	0	0	1	0	1	0	1
Glycera nana	0	1	1	2	0	0	1	1	0	1	1	1	0	0	1
Glyceridae spp. indet.	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Glycinde polygnatha	0	1	1	0	0	0	0	1	1	1	0	1	1	0	0
Glyphanostomum pallescens	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0
Goniadidae spp. indet.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gyptis sp. 1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gyptis sp. 2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Haplomesus sp. 2	0	0	0	4	2	0	0	2	1	0	1	1	2	0	5
Haploniscus sp. 1	4	13	0	10	7	0	2	11	13	4	1	1	8	3	24
Haploniscus sp. 2	0	0	0	0	0	0	0	0	4	1	0	0	0	0	9
Haploops lodo	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Harpiniopsis emeryi	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Harpiniopsis nr. galerus	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1
Harpiniopsis profundis	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Harpiniopsis sp. 4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Harpiniopsis sp. 5	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Harpiniopsis sp. 6	0	0	0	0	0	0	0	0	0	0	6	0	1	1	0
Hebefustis sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Hemilamprops sp. 1	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0
Hesionidae sp. 1	0	0	0	1	0	0	0	1	2	0	0	0	0	0	0
Hesionidae sp. 2	2	0	0	3	6	1	0	0	3	24	0	0	1	0	2
Hesionidae spp. indet.	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Holothuroidea spp. indet.	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Ileraustroe sp. 2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Ilyarachna cf. acarina	0	0	0	0	1	1	0	0	1	0	0	1	0	0	1
Ilyarachna cf. profunda	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0
Janirella cf. ornata	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0
Jasmineira sp. 2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Kefersteinia sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Kelliella galathea	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Kinbergonuphis nr. nannognathus	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Kinbergonuphis proalopus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Kophobelemnon cf. affinis	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Labidoplax nr. buski	0	2	3	0	0	4	5	0	0	0	0	3	2	0	4
Lacydonia hampsoni	0	0	1	2	0	0	0	0	1	1	1	1	1	2	0
Laetmogonidae sp. 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Laonice sp. 1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Laonice sp. 4	1	0	1	0	0	0	1	1	1	0	0	1	0	2	0
Laphania sp. 1	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0
Leaena sp. 1	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0
Leitoscoloplos sp. 1	1	0	0	0	0	0	0	1	0	0	0	3	0	0	0
Leodamas sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Lepechinella sp. 2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lepechinella sp. 4	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0
Lepidepecreum sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Lepidepecreum sp. 2	1	0	0	0	1	0	0	0	0	0	2	0	0	0	0
Leptaxinus cf. minutus	17	13	2	25	9	1	0	7	14	0	7	0	7	9	5
Leptognathia sp. 2	0	0	0	4	0	0	0	0	0	0	0	0	0	6	0
Leptognathiella nr. abyssi	0	0	0	0	0	0	4	0	0	0	0	1	0	0	0
Leptostylis sp. 1	0	1	0	1	1	1	0	0	3	0	1	0	0	0	0
Leucon (Crymoleucon) sp. 1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Leucon (Crymoleucon) sp. 2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Leucon (Leucon) sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Levinsenia flava	25	63	19	16	26	6	58	63	29	25	9	42	75	37	78
Levinsenia gracilis	1	0	0	1	2	2	0	0	1	2	0	5	0	0	0
Levinsenia sp. 1	0	0	0	0	0	0	0	0	2	0	0	0	2	0	1
Levinsenia sp. 3	0	5	3	10	26	6	0	4	1	0	3	1	3	1	4
Levinsenia sp. 5	4	1	0	0	0	0	0	0	0	43	0	0	0	0	0
Levinsenia sp. 6	0	0	3	8	6	5	2	0	0	5	4	13	0	2	1
Levinsenia sp. A	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Liljeborgia cota	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Lugia sp. 1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Lumbriclymene lineus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Lumbrineridae spp. indet.	6	9	1	12	7	0	1	8	3	13	6	0	4	4	8

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Lumbrineris californiensis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbrineris cruzensis	0	6	0	2	1	0	0	0	0	1	0	0	0	8	2
Lumbrineris pallida	0	0	0	1	0	1	1	0	0	0	0	1	0	0	0
Lumbrineris sp. 1	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Lysianassidae sp. 1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lysilla loveni	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Lysippe labiata	0	0	1	10	0	3	0	2	0	0	0	0	0	0	0
Macroclymene sp. 1	0	0	0	9	0	0	0	0	0	0	0	0	0	3	0
Makrokylindrus sp. 1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Maldane cristata	1	0	0	10	5	0	0	0	0	6	0	0	0	2	0
Maldane monilata	7	2	6	1	1	7	6	2	1	0	7	1	0	1	1
Maldane sp. 1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Maldanidae spp. indet.	9	14	2	27	17	24	21	10	17	2	11	4	1	8	13
Malletia talama	1	0	0	0	3	0	0	0	2	0	0	0	0	2	0
Mayerella banksia	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0
Melinna heterodonta	5	0	0	0	1	0	0	0	0	0	1	0	1	0	0
Mendicula ferruginosa	10	1	0	54	4	0	0	1	4	79	9	0	0	2	0
Mesosignum cf. asperum	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Microclymene cf. caudata	3	0	0	3	14	1	0	1	0	1	1	0	2	1	1
Mirabilicoxa cf. richardsoni	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mirabilicoxa sp. 2	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0
Mirabilicoxa sp. 4	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0
Mirabilicoxa sp. 5	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Mirabilicoxa sp. 6	0	0	0	0	0	0	0	0	0	5	0	7	0	0	0
Mugga wahrbergi	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Munnopsidae sp. 3	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0
Munnopsidae spp. indet.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Munnopsurus sp. 1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Munnopsurus sp. 4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Myriochele nr. gracilis	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Myriochele nr. olgae	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0
Myriotrocha sp. 1	0	0	0	0	0	4	3	0	1	0	0	0	0	0	1
Myriowenia sp. 1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Mystides caeca	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0
Mystides rarica	1	1	0	2	2	2	2	3	3	0	0	0	2	0	2
Nannoniscoides sp. 1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Nannoniscus cristatus	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0
Nannoniscus sp. 2	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
Naticidae spp. indet.	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Neilonella mexicana	0	0	0	2	0	0	0	2	0	10	6	0	0	3	0
Neilonellidae spp. indet.	1	1	0	0	0	0	0	0	0	4	0	0	0	0	1
Nematomenia sp. ?	0	0	0	13	0	0	0	0	1	10	1	0	0	0	0
Nemertea sp. 10	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Nemertea sp. 11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nemertea sp. 12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Nemertea sp. 5	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0

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	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Nemertea sp. 6	0	3	0	3	2	0	6	8	15	11	0	0	9	0	10
Nemertea sp. 7	0	0	2	0	1	0	0	3	4	0	0	1	3	0	0
Nemertea sp. 8	5	0	1	0	7	1	0	0	2	3	0	5	3	0	1
Nemertea sp. 9	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Nemertea sp. A (Carinomella)	7	22	15	17	21	10	15	22	19	7	1	7	19	8	22
Nemertea spp. indet.	1	5	3	0	0	0	0	7	0	0	0	0	1	0	0
Neoheteromastus lineus	0	2	1	0	0	2	7	2	3	0	0	3	0	0	2
Neomediomastus glabrus	0	3	0	0	0	3	1	0	0	0	1	0	0	0	0
Neomeniod sp. A	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Neomeniod sp. B	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Neomeniod sp. C	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0
Neomeniod sp. D	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Neomeniod sp. E	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Neonotomastus glabrus	0	1	4	3	2	7	8	4	6	2	0	6	6	0	3
Neotanais armiger	10	0	0	0	0	0	0	2	0	0	0	0	15	0	5
Nephasoma diaphanes	0	0	0	0	1	0	0	1	0	0	3	0	0	0	0
Nephtyidae spp. indet.	0	1	0	0	0	1	0	0	0	4	0	1	0	0	0
Nereis sp. 1	0	1	0	1	3	0	0	1	0	0	0	0	0	1	0
Ninoe gemmea	0	0	0	1	0	0	0	0	0	11	0	0	0	5	0
Ninoe sp. 1	0	0	0	0	0	0	0	1	1	3	5	0	0	7	1
Notomastus abyssalis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Notomastus latericeus	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Notomastus lineatus	0	0	0	16	1	0	0	0	1	0	9	0	0	0	0
Notomastus precosis	0	0	0	4	0	0	3	0	1	0	5	1	0	6	0
Notomastus profundus	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0
Notoproctus oculatus	0	1	0	0	2	0	0	0	1	0	0	0	0	0	0
Notoxenoides sp. 3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
nr. Halice sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
nr. Ileraustroe sp. 1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
nr. Pardiliscella sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
nr. Xylophaga sp. 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Nucula carlottensis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Oecidiobranchus sp. 1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Oedicerotidae sp. 1	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0
Oedicerotidae sp. 2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Onuphidae spp. indet.	1	2	3	4	3	2	1	0	2	2	1	1	0	0	2
Onuphis geophiliformis	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Onuphis nr. vibex	1	2	0	21	7	0	0	0	0	0	0	0	0	2	7
Opheliidae spp. indet.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ophelina acuminata	1	0	0	0	0	0	0	0	0	11	1	0	0	0	0
Ophelina farallonensis	1	9	1	9	8	4	1	1	16	3	5	2	3	4	6
Ophelina sp. 1	0	0	18	0	0	0	0	0	0	1	0	0	0	0	0
Ophiacantha bairdi	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
Ophiacantha diplasia	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Ophiacantha macrarthra	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1
Ophiacantha normanii	0	3	1	0	0	2	5	0	3	0	0	1	0	0	2

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	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Ophiophura sp. 1	0	0	0	1	4	0	0	0	0	0	0	0	1	0	0
Ophiura leptoctenia	0	1	1	0	0	4	0	3	0	0	0	0	0	0	0
Ophiura sp. 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea sp. 1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0
Ophiuroidea spp. indet.	0	4	0	0	3	0	0	2	0	0	0	0	0	0	4
Ophryotrocha labidium	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Ophryotrocha obtusa	0	0	0	0	3	0	0	0	0	0	0	0	2	0	2
Ophryotrocha sp. 1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Ophryotrocha sp. 3	0	0	0	0	0	0	2	2	1	0	0	0	0	0	1
Ophryotrocha sp. 5	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Ophryotrocha sp. 6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Orbiniella sp. 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Oweniidae spp. indet.	2	3	0	0	8	2	0	6	0	3	0	2	1	0	1
Paradiopatra sp. 1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Paradoneis lyra	3	2	2	1	2	1	1	13	5	0	4	3	3	6	4
Paradoneis sp. 3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Paragathotanais sp. 1	1	0	0	0	1	1	3	3	0	0	0	1	0	0	1
Paralysippe annectens	1	0	0	0	4	0	0	0	0	19	2	0	0	13	0
Paramage scutata	0	1	0	0	1	0	1	0	0	0	0	3	0	0	0
Paramphinome sp. 1	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Paramunna sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Paranaitis sp. 1	0	2	0	0	1	2	0	0	0	2	1	0	0	0	0
Paranarthrura sp. 1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Paraonella monilaris	0	1	0	0	7	0	0	1	0	2	6	0	3	3	0
Paraonella sp. 1	0	3	0	12	2	2	1	1	2	0	2	3	2	0	2
Paraonidae spp. indet.	0	0	1	0	0	1	0	0	0	2	3	0	0	0	0
Parougia sp. 1	1	0	2	0	1	0	0	1	3	0	3	0	0	2	0
Parpano sp. 1	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0
Pennatulacea spp. indet.	0	0	0	0	1	0	1	0	0	0	0	0	0	1	2
Peraeospinosus sp. 3	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0
Pettiboneia bathyalis	1	0	2	0	3	0	0	0	0	7	0	1	0	1	0
Pettiboneia brevipalpa	7	12	3	10	10	9	5	26	12	2	1	6	8	11	15
Pholoe sp. 1	0	1	0	3	3	4	7	1	0	1	1	4	1	7	2
Pholoidae spp. indet.	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0
Photis typhlops	0	0	0	1	0	0	0	0	0	3	0	0	0	1	0
Phoxocephalidae spp. indet.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllochaetopterus limicolus	0	0	0	3	2	0	0	3	1	0	0	1	0	0	1
Plawenia sp. ?	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Pleurogonium californiense	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pleurogonium sp. 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pleurotomella sp. 2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polinices pallidus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polybrachia canadensis	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Polynoidae spp.	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Potamethus mucronatus	0	0	0	2	0	0	0	1	2	0	2	0	0	1	0

APPENDIX C. Infaunal Abundance Data for 15 SF-DODS Stations Sampled in September 2002.

	Station														
Taxon	**6**	**10**	**13**	**16**	**17**	**19**	**20**	**23**	**27**	**50**	**57**	**64**	**92**	**114**	**116**
Praxillella gracilis	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
Prionospio delta	16	29	34	2	20	15	19	36	11	1	1	73	75	2	35
Prionospio fauchaldi	4	5	5	0	2	1	9	5	5	11	0	12	7	7	9
Prionospio nr. steenstrupi	1	1	0	0	1	2	0	2	0	5	2	0	0	0	0
Prionospio sp. 3	1	0	0	0	1	0	0	0	0	0	0	0	0	4	0
Prionospio sp. 8	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0
Procampylaspis sp. 1	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0
Prochelator sp. 1	1	0	0	0	3	0	0	0	1	0	0	0	0	0	0
Prochelator sp. 6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Prochelator sp. 7	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Proclea cf. graffi	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0
Propebela sp. 1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Protankyra nr. abyssicola	2	6	2	2	1	3	0	2	1	0	2	2	2	0	3
Protobranchia spp. indet.	0	0	0	6	3	1	3	0	4	0	0	0	0	0	0
Pseudarachna sp. 1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	2
Pseudharpinia excavata	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pseudharpinia sp. 1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pseudotanais sp. 1	0	0	0	0	0	0	2	1	1	0	1	0	0	0	0
Pseudotanais sp. 2	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Pseudotanais sp. 3	0	0	0	0	0	0	0	0	0	0	0	10	3	1	2
Pseudotanais sp. 4	0	2	0	1	0	2	1	0	1	1	1	0	0	1	0
Pseudotanais sp. 8	0	0	0	1	0	0	0	0	0	4	1	0	0	0	0
Rhabdus rectius	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Rhodine bitorquata	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Sabellidae spp. indet.	1	0	0	3	0	0	1	0	0	0	0	5	0	0	0
Saxicavella sp. 1	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0
Scalibregma californicum	0	1	1	4	1	1	2	0	1	3	1	0	0	0	0
Scalibregmatidae spp. indet.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Schisturella sp. 1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0
Scolelepis sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Scoloura sp. 1	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0
Siboglinum sp. 1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Siboglinum sp. 2	0	0	0	0	0	4	0	0	0	0	0	0	1	0	0
Sigalionidae spp. indet.	0	4	0	2	1	2	0	0	4	1	0	0	0	0	6
Sigambra setosa	0	0	0	1	1	0	0	0	1	0	0	3	2	0	1
Sigambra tentaculata	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Sige brunnea	4	4	2	0	5	0	3	0	4	0	0	3	1	1	2
Siphonodentalium sp. 1	0	0	0	1	0	0	0	0	0	15	0	0	0	0	0
Siphonolabrum sp. 1	1	2	1	5	6	14	3	1	0	2	3	2	1	1	0
Siphonolabrum sp. 2	0	5	0	0	0	1	0	1	2	1	0	0	0	0	0
Sipuncula spp. indet.	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0
Solemya sp. 1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Sosanopsis wireni	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Spatangoidea sp. 1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1
Sphaerodoropsis biserialis	0	2	0	0	0	0	0	0	0	5	0	0	0	0	0
Sphaerodoropsis sp. 5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

APPENDIX D

Taxonomic list of infaunal species identified from SF-DODS stations sampled in September 2002

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

COELENTERATA

Class Anthozoa
Edwardsia sp. 1
Edwardsia sp. 2
Edwardsia sp. 3
Kophobelemnon cf. *affinis*

NEMERTEA

Nemertea sp. A (*Carinomella*)
Cerebratulus sp. 1
Nemertea sp. 5
Nemertea sp. 6
Nemertea sp. 7
Nemertea sp. 8
Nemertea sp. 9
Nemertea sp. 10
Nemertea sp. 11
Nemertea sp. 12

ANNELIDA -- POLYCHAETA

Family Aberrantidae
Aberranta sp. 1

Family Acrocirridae
Flabelligella sp. 1

Family Ampharetidae
Ampharete finmarchica (Sars, 1864)
Amphicteis mucronata Moore, 1923
Amphicteis vestis Hartman, 1965
Anobothrus gracilis (Malmgren, 1866)
Anobothrus sp. 2
Anobothrus sp. 3
Glyphanostomum pallescens (Théel, 1878)
Lysippe labiata Malmgren, 1866
Melinna heterodonta Moore, 1923
Mugga wahrbergi Eliason, 1955
Paralysippe annectens (Moore, 1923)
Paramage scutata (Moore, 1923)
Sosanopsis wireni Hessle, 1917
Ampharetidae sp. 1
Ampharetidae sp. 3
Ampharetidae sp. 4

Family Amphinomidae
Paramphinome sp. 1

Family Aphroditidae
Aphroditidae spp. indet.

Family Apistobranchidae
Apistobranchus ornatus Hartman, 1965

Family Capitellidae
Neoheteromastus lineus Hartman, 1960
Neomediomastus glabrus (Hartman, 1960)
Neonotomastus glabrus Fauchald, 1972
Notomastus abyssalis Fauchald, 1972
Notomastus latericeus Sars, 1851
Notomastus lineatus Claparède, 1870
Notomastus precosis Hartman, 1960
Notomastus profundus Eisig, 1887
Capitellidae n. gen. n. sp. 1

Family Chaetopteridae
Phyllochaetopterus limicolus Hartman, 1960

Family Chrysopetalidae
Dysponetus sp. 1

Family Cirratulidae
Aphelochaeta cf. *glandaria*
Aphelochaeta nr. *monilaris* (Hartman, 1960)
Aphelochaeta sp. 1
Aphelochaeta sp. 2
Aphelochaeta sp. 7
Aphelochaeta sp. 8
Aphelochaeta sp. 9
Aphelochaeta sp. 10
Chaetozone spinosa (Moore, 1905)
Chaetozone sp. 1
Chaetozone sp. 4
Chaetozone sp. 6
Chaetozone sp. 8
Tharyx kirkegaardi Blake, 1991

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Cossuridae
- *Cossura brunnea* Fauchald, 1972
- *Cossura modica* Fauchald & Hancock, 1981
- *Cossura pygodactylata* Jones, 1956
- *Cossura rostrata* Fauchald, 1972

Family Dorvilleidae
- *Anchidorvillea moniliformis* Hilbig & Blake, 1991
- *Exallopus intermedius* Hilbig & Blake, 1991
- *Exallopus* sp. 1
- *Ophryotrocha labidion* Hilbig & Blake, 1991
- *Ophryotrocha obtusa* Hilbig & Blake, 1991
- *Ophryotrocha* sp. 1
- *Ophryotrocha* sp. 3
- *Ophryotrocha* sp. 5
- *Ophryotrocha* sp. 6
- *Parougia* sp. 1
- *Pettiboneia bathyalis* Hilbig & Ruff, 1990
- *Pettiboneia brevipalpa* Hilbig & Ruff, 1990

Family Fauveliopsidae
- *Fauveliopsis glabra* (Hartman, 1960)

Family Flabelligeridae
- *Brada pilosa* Moore, 1906
- *Brada pleurobranchiata* (Moore, 1923)
- *Diplocirrus* sp. 1
- *Diplocirrus* sp. 3
- *Flabelligera* sp. 1

Family Glyceridae
- *Glycera americana* Leidy, 1855
- *Glycera nana* Johnson, 1901

Family Goniadidae
- *Bathyglycinde cedroensis* Fauchald, 1972
- *Glycinde polygnatha* Hartman, 1950

Family Hesionidae
- *Gyptis* sp. 1
- *Gyptis* sp. 2
- *Kefersteinia* sp. 1
- Hesionidae sp. 1
- Hesionidae sp. 2

Family Lacydoniidae
- *Lacydonia hampsoni* Blake, 1994

Family Lumbrineridae
- *Eranno* sp. 1
- *Lumbrineris californiensis* Hartman, 1944
- *Lumbrineris cruzensis* Hartman, 1944
- *Lumbrineris pallida* Hartman, 1944
- *Lumbrineris* sp. 1
- *Ninoe gemmea* Moore, 1911
- *Ninoe* sp. 1

Family Maldanidae
- *Clymenura gracilis* Hartman, 1961
- *Clymenura* sp. 1
- *Euclymene* sp. 1
- *Lumbriclymene lineus* Hartman, 1960
- *Macroclymene* sp. 1
- *Maldane cristata* Treadwell, 1923
- *Maldane monilata* Fauchald, 1972
- *Maldane* sp. 1
- *Microclymene* cf. *caudata* Imajima & Shiraki, 1982
- *Notoproctus oculatus* Sars, 1851
- *Praxillella gracilis* (Sars, 1861)
- *Rhodine bitorquata* Moore, 1923

Family Nephtyidae
- *Aglaophamus paucilamellata* Fauchald, 1972

Family Nereididae
- *Ceratocephale pacifica* Hartman, 1960
- *Nereis* sp. 1

Family Oenonidae (=Arabellidae)
- *Drilonereis falcata* Moore, 1911

Family Onuphidae
- *Kinbergonuphis* nr. *nannognathus* Chamberlin, 1919
- *Kinbergonuphis proalopus* Chamberlin, 1919
- *Onuphis geophiliformis* (Moore, 1903)
- *Onuphis* nr. *vibex* (Fauchald, 1972)
- *Paradiopatra* sp. 1

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Opheliidae
- *Ophelina acuminata* Ørsted, 1843
- *Ophelina farallonensis* Blake, 2000
- *Ophelina* sp. 1
- *Travisia brevis* Moore, 1923

Family Orbiniidae
- *Leitoscoloplos* sp. 1
- *Leodamas* sp. 1
- *Orbiniella* sp. 1

Family Oweniidae
- *Galathowenia pygidialis* (Hartman, 1960)
- *Myriochele* nr. *gracilis* Hartman, 1955
- *Myriochele* nr. *olgae* Blake, 2000
- *Myriowenia* sp. 1

Family Paraonidae
- *Arcidea* cf. *hartleyi* Blake, 1996
- *Arcidea* cf. *pseudoarticulata* Hobson, 1972
- *Aricidea quadrilobata* Webster & Benedict, 1887
- *Aricidea ramosa* Annenkova, 1934
- *Aricidea simplex* Day, 1963
- *Aricidea simplex* Type 2
- *Aricidea wassi* Pettibone, 1965
- *Aricidea* sp. 1
- *Aricidea* sp. 3
- *Aricidea* sp. 4
- *Aricidea* sp. 5
- *Aricidea* sp. 12
- *Aricidea* sp. 14
- *Cirrophorus branchiatus* Ehlers, 1908
- *Cirrophorus furcatus* (Hartman, 1957)
- *Levinsenia flava* Strelzov, 1973
- *Levinsenia gracilis* (Tauber, 1879)
- *Levinsenia* sp. 1
- *Levinsenia* sp. 3
- *Levinsenia* sp. 5
- *Levinsenia* sp. 6
- *Levinsenia* sp. A
- *Paradoneis lyra* (Southern, 1914)
- *Paradoneis* sp. 3
- *Paraonella monilaris* (Hartman & Fauchald, 1971)
- *Paraonella* sp. 1

Family Pholoidae
- *Pholoe* sp. 1

Family Phyllodocidae
- *Chaetoparia careyi* Fauchald & Hancock, 1981
- *Eulalia* sp.
- *Lugia* sp. 1
- *Mystides caeca* Langerhans, 1880
- *Mystides rarica* (Uschakov, 1958)
- *Paranaitis* sp. 1
- *Sige brunnea* (Fauchald, 1972)

Family Pilargidae
- *Ancistrosyllis groenlandica* McIntosh, 1879
- *Sigambra setosa* Fauchald, 1972
- *Sigambra tentaculata* (Treadwell, 1941)

Family Polynoidae
- Polynoidae spp. indet.

Family Sabellidae
- *Euchone velifera* Banse, 1972
- *Jasmineira* sp. 2
- *Potamethus mucronatus* (Moore, 1923)

Family Scalibregmatidae
- *Asclerocheilus beringianus* Uschakov, 1955
- *Asclerocheilus* sp. 4
- *Scalibregma californicum* Blake, 2000

Family Sigalionidae
- *Ehlersileanira* sp. 1
- *Ehlersileanira* sp. 2

Family Sphaerodoridae
- *Clavodorum* sp. 2
- *Sphaerodoropsis biserialis* (Berkeley & Berkeley, 1944)
- *Sphaerodoropsis* sp. 5
- *Sphaerodoropsis* sp. 6
- *Sphaerodoropsis* sp. 7

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Spionidae

Aurospio dibranchiata Maciolek, 1981
Laonice sp. 1
Laonice sp. 4
Prionospio delta Hartman, 1965
Prionospio fauchaldi Maciolek, 1985
Prionospio nr. *steenstrupi* Malmgren, 1867
Prionospio sp. 3
Prionospio sp. 8
Scolelepis sp. 1
Spiophanella sp. 1
Spiophanes anoculata Hartman, 1960
Spiophanes kroyeri Grube, 1860

Family Syllidae

Braniella palpata Hartman, 1967
Braniella sp. 1
Sphaerosyllis sp. 1

Family Terebellidae

Laphania sp. 1
Leaena sp. 1
Lysilla loveni Malmgren, 1866
Proclea cf. *graffii* (Langerhans, 1884)
Amphitritinae sp. 1
Amphitritinae sp. 3

Family Trichobranchidae

Terebellides sp. 1
Terebellides sp. 2
Terebellides sp. 3
Trichobranchus sp. 1
Trichobranchidae sp. 7

Family Unknown

Polychaeta sp. 1

POGONOPHORA

Polybrachia canadensis (Ivanov, 1962)
Siboglinum sp. 1
Siboglinum sp. 2

SIPUNCULA

Nephasoma diaphanes (Gerould, 1913)

ECHIURA

Echiura sp. 1
Echiura sp. 2

MOLLUSCA -- APLACOPHORA

Elutheromenia ? sp.
Genitoconia sp. ?
Nematomenia sp. ?
Plawenia sp. ?
Spiomenia sp. ?
Neomeniod sp. A
Neomeniod sp. B
Neomeniod sp. C
Neomeniod sp. D
Neomeniod sp. E
Chaetodermamorpha spp. indet.

MOLLUSCA -- BIVALVIA

Family Arcidae

Bathyarca nucleator (Dall, 1908)
Bathynearera tillamookensis (Dall, 1916)

Family Hiatellidae

Saxicavella sp. 1

Family Kelliidae

Kelliella galatheae (Knudsen, 1970)

Family Malletiidae

Malletia talama Dall, 1916

Family Neilonellidae

Austrotindaria gibbsii (Dall, 1897)
Neilonella mexicana (Dall, 1908)

Family Nuculanidae

Yoldiella nr. *minuscula* Verrill and Bush, 1898
Yoldiella orcia (Dall, 1916)
Yoldiella sp. 1

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Nuculidae
Deminucula nr. *atacellana* (Schenck, 1939)
Rhind and Allen, 1992
Nucula carlottensis Dall, 1897

Family Pectinidae
Cyclopecten bistriatus (Dall, 1916)

Family Pholadidae
nr. *Xylophaga* sp. 1

Family Solemyidae
Acharax johnsoni (Dall, 1891)
Solemya sp. 1

Family Thyasiridae
Adontorhina lynnae Coan, Scott and Bernard, 2000
Axinopsida sp. 1 (2002)
Leptaxinus cf. *minutus* Verrill & Bush, 1898
Mendicula ferruginosa (Forbes, 1844)
Thyasira (*Axinulus*) sp. 1
Thyasira cf. *cygnus* Dall, 1916
Thyasira flexuosa (Montagu, 1803)
Thyasira orecta Bernard, 1982
Thyasira sp. 1
Thyasira sp. 2
Thyasiridae sp. 1
Thyasiridae sp. 2

MOLLUSCA -- GASTROPODA

Family Acteonidae
Acteonidae sp. 1

Family Buccinidae
Colus cf. *glyptus* (Verrill, 1882)
Colus cf. *jordani* (Dall, 1913)

Family Naticidae
Polinices pallidus Broderip & Sowerby, 1829

Family Scissurellidae
Scissurella sp. 1

Family Turridae
Pleurotomella sp. 2
Propebela sp. 1

MOLLUSCA -- SCAPHOPODA

Family Dentaliidae
Rhabdius rectius (Carpenter, 1864)
Siphonodentalium sp. 1

ARTHROPODA -- AMPHIPODA

Family Ampeliscidae
Ampelisca catalinensis Barnard, 1954
Ampelisca plumosa Holmes, 1908
Ampelisca sp. 1
Byblis nr. *crassicornis* Barnard, 1971
Haploops lodo Barnard, 1961

Family Argissidae
Argissa ap. 1

Family Caprellidae
Mayerella banksia Laubitz, 1970
Caprellidae (nr. *Leuconacia*) sp. 1

Family Isaeidae
Photis typhlops Conlan, 1994

Family Ischyroceridae
Bonnierella linearis Barnard, 1964

Family Lepechinellidae
Lepechinella sp. 2
Lepechinella sp. 4

Family Liljeborgiidae
Liljeborgia cota Barnard, 1962

Family Lysianassidae
Lepidepecreum sp. 1
Lepidepecreum sp. 2
Lysianassidae sp. 1

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Oedicerotidae
- *Aceroides* sp. 1
- *Bathymedon flebilis* Barnard, 1967
- *Bathymedon* nr. *saussurei* (Boeck, 1871)
- *Bathymedon* sp. 1
- Oedicerotidae sp. 1
- Oedicerotidae sp. 2

Family Pardaliscidae
- nr. *Halice* sp. 1
- nr. *Pardiliscella* sp. 1
- *Parpano* sp. 1

Family Phoxocephalidae
- *Harpiniopsis emeryi* Barnard, 1960
- *Harpiniopsis* nr. *galerus* Barnard, 1960
- *Harpiniopsis profundis* Barnard, 1960
- *Harpiniopsis* sp. 4
- *Harpiniopsis* sp. 5
- *Harpiniopsis* sp. 6
- *Pseudharpinia excavata* (Chevreux, 1887)
- *Pseudharpinia* sp. 1

Family Synopiidae
- *Bruzelia tuberculata* Sars, 1895
- nr. *Ileraustroe* sp. 1
- *Ileraustroe* sp. 2
- *Syrrhoe* sp. 2

ARTHROPODA -- CUMACEA

Family Diastylidae
- *Makrokylindrus* sp. 1

Family Lampropidae
- *Hemilamprops* sp. 1

Family Leuconidae
- *Eudorella* sp. 1
- *Eudorella* sp. 2
- *Leptostylis* sp. 1
- *Leucon (Crymoleucon)* sp. 1
- *Leucon (Crymoleucon)* sp. 2
- *Leucon (Leucon)* sp. 1

Family Nannastracidae
- *Atlantocuma* (?) sp. 1
- *Campylaspis* sp. 1
- *Campylaspis* sp. 2
- *Campylaspis* sp. 3
- *Procampylaspis* sp. 1

ARTHROPODA -- ISOPODA

Family Dendrotiidae
- *Dendrotion* sp. 1

Family Desmosomatidae
- *Chelator* sp. 1
- *Chelator* sp. 2
- *Chelator* sp. 3
- *Desmosoma* sp. 1
- *Desmosoma* sp. 2
- *Eugerda* sp. 1
- *Eugerda* sp. 4
- *Eugerda* sp. 5
- *Eugerda* sp. 6
- *Eugerdella* cf. *pugilator* Hessler, 1970
- *Eugerdella* sp. 1
- *Mirabilicoxa* cf. *richardsoni* Mezhov, 1986
- *Mirabilicoxa* sp. 2
- *Mirabilicoxa* sp. 4
- *Mirabilicoxa* sp. 5
- *Mirabilicoxa* sp. 6
- *Oecidiobranchus* sp. 1
- *Prochelator* sp. 1
- *Prochelator* sp. 6
- *Prochelator* sp. 7

Family Haploniscidae
- *Haploniscus* sp. 1
- *Haploniscus* sp. 2

Family Ischnomesidae
- *Haplomesus* sp. 2

Family Janirellidae
- *Janirella* cf. *ornata* Birstein, 1960

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Mesosignidae
Mesosignum cf. *asperum* Menzies & Frankenburg, 1968

Family Munnopsidae
Acanthomunna sp. 1
Acanthomunna sp. 2
Bathybadistes sp. 1
Betamorpha cf. *megista* Thistle & Hessler, 1977
Disconectes sp. 2
Ilyarachna acarina Menzies and Barnard, 1959
Ilyarachna cf. *profunda* Schultz, 1966
Munnopsurus sp. 1
Munnopsurus sp. 4
Pseudarachna sp. 1
Munnopsidae sp. 3

Family Nannoniscidae
Exiliniscus sp. 1
Exiliniscus sp. 2
Hebefustis sp. 1
Nannoniscoides sp. 1
Nannoniscus cristatus Mezhov, 1986
Nannoniscus sp. 2

Family Paramunnidae
cf. *Notoxenoides* sp. 1
Notoxenoides sp. 3
Paramunna sp. 1
Pleurogonium californiense Menzies, 1951
Pleurogonium sp. 1

ARTHROPODA -- TANAIDACEA

Family Anarthuridae
Agathotanais sp. 1
Araphura sp. 2
Cryptocope sp. 2
Leptognathia sp. 2
Leptognathiella nr. *abyssi* Hansen, 1913
Paragathotanais sp. 1
Paranarthrura sp. 1
Scoloura sp. 1
Siphonolabrum sp. 1
Siphonolabrum sp. 2
Tanaella forcifera (Lang, 1968)
Akanthophoreinae sp. 6
Akanthophoreinae sp. 7
Anarthrurinae sp. 1
Anarthrurinae sp. 2
Anarthrurinae sp. 4
Anarthrurinae sp. 6
Anarthrurinae sp. 8

Family Neotanaidae
Neotanais armiger Wolff, 1956

Family Pseudotanaidae
Pseudotanais sp. 1
Pseudotanais sp. 2
Pseudotanais sp. 3
Pseudotanais sp. 4
Pseudotanais sp. 8

Family Typhlotanaidae
Peraeospinosus sp. 3
Typhlotanais sp. 2
Typhlotanaidae sp. 1
Typhlotanaidae sp. 6
Typhlotanaidae sp. 8

Family Whiteleggiidae
Carpoapseudes sp. 1

ECHINODERMATA -- ECHINOIDEA

Spatangoida sp. 1

ECHINODERMATA -- HOLOTHUROIDEA

Family Cucumariidae
Thyone sp. 1

Family Laetmogonidae
Laetmogonidae sp. 1

Family Synaptidae
Labidoplax nr. *buski* McIntosh
Myriotrochus sp. 1
Protankyra nr. *abyssicola* Théel, 1886

APPENDIX D. Taxonomic list of infaunal species* identified from SF-DODS stations sampled in September 2002.

Family Ypsilothuriidae
Ypsilothuria bitentaculata Ludwig, 1894

ECHINODERMATA -- OPHIUROIDEA

Family Amphiuridae
Amphiura carchara Clark, 1911
Amphiura diomedeae Lyman, 1882

Family Ophiacanthidae
Ophiacantha macrarthra Clark, 1911
Ophiacantha diplasia Clark, 1911
Ophiacantha normani Lyman, 1879
Ophiolimna bairdi (Lyman, 1883)
Ophiophura sp. 1

Family Ophiuridae
Ophiura leptoctenia Clark, 1911
Ophiura sp. 1

Family unknown
Ophiuroidea sp. 1

* Chaetodermamorpha spp. indet., Aphroditidae spp. indet., and Polynoidae spp. indet., included in the above list to represent taxa not otherwise listed, were not included in the total number of species calculated for the infaunal composition section.

APPENDIX E

Dominant taxa at SF-DODS stations sampled in September 2002

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

Abundance of those organisms that could not be identified to species are included in percentage calculations but are not ranked.

SF-DODS Station 6			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Aricidea simplex* (polychaete)	51	8.5
-	Chaetodermamorpha spp. (aplacophoran)	47	7.8
2	*Aricidea* sp. 5 (polychaete)	44	7.3
3	*Chaetozone* sp. 1 (polychaete)	34	5.7
4	*Thyasira flexuosa* (bivalve)	31	5.2
5	*Levinsenia flava* (polychaete)	25	4.2
6	*Cossura rostrata* (polychaete)	22	3.7
7	*Araphura* sp. 2 (tanaid)	19	3.2
8	*Leptaxinus* cf. *minutus* (bivalve)	17	2.8
9	*Cossura modica* (polychaete)	16	2.7
9	*Prionospio delta* (polychaete)	16	2.7
10	*Aricidea simplex* - type 2 (polychaete)	14	2.3
	Total Cumulative (dominant taxa)	336	55.9
	Total Cumulative (remaining taxa)	265	44.1
	Total All 110 Taxa	601	100.0

SF-DODS Station 10			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Levinsenia flava* (polychaete)	63	9.7
-	Chaetodermamorpha spp. (aplacophoran)	50	7.7
2	*Chaetozone* sp. 4 (polychaete)	32	4.9
3	*Prionospio delta* (polychaete)	29	4.5
4	*Cossura rostrata* (polychaete)	22	3.4
4	Nemertea sp. A (*Carinomella)*	22	3.4
5	*Aricidea* sp. 4 (polychaete)	20	3.1
6	*Chaetozone* sp. 1 (polychaete)	16	2.5
-	Cirratulidae spp. indet. (polychaete)	16	2.5
7	*Aricidea simplex* (polychaete)	15	2.3
7	*Aricidea* sp. 3 (polychaete)	15	2.3
-	Maldanidae spp. indet. (polychaete)	14	2.2
8	*Haploniscus* sp. 1 (isopod)	13	2.0
8	*Leptaxinus* cf. *minutus* (bivalve)	13	2.0
9	*Axinopsida* sp. 1 (2002) (bivalve)	12	1.9
9	*Pettiboneia brevipalpa* (polychaete)	12	1.9
10	*Cossura modica* (polychaete)	10	1.5
	Total Cumulative (dominant taxa)	374	57.7
	Total Cumulative (remaining taxa)	274	42.3
	Total All 129 Taxa	648	100.0

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 13			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Prionospio delta* (polychaete)	34	12.5
2	*Chaetozone spinosa* (polychaete)	25	9.2
3	*Levinsenia flava* (polychaete)	19	7.0
4	*Chaetozone* sp. 1 (polychaete)	18	6.6
4	*Ophelina* sp. 1 (polychaete)	18	6.6
5	Nemertea sp. A (*Carinomella*)	15	5.5
6	*Cossura rostrata* (polychaete)	13	4.8
7	*Cossura modica* (polychaete)	9	3.3
-	Chaetodermamorpha spp. (aplacophoran)	8	2.9
8	*Cossura brunnea* (polychaete)	6	2.2
8	*Maldane monilata* (polychaete)	6	2.2
9	Capitellidae n. gen. n. sp. 1 (polychaete)	5	1.8
9	*Prionospio fauchaldi* (polychaete)	5	1.8
-	Dorvilleidae spp. indet. (polychaete)	4	1.5
10	*Neonotomastus glabrus* (polychaete)	4	1.5
10	*Ypsilothuria bitentaculata* (holothurian)	4	1.5
	Total Cumulative (dominant taxa)	193	71.0
	Total Cumulative (remaining taxa)	79	29.0
	Total All 65 Taxa	272	100.0

SF-DODS Station 16			
Rank	**Taxa**	**Count (0.1 m^2)**	**Percentage**
1	*Aricidea simplex* (polychaete)	194	18.2
2	*Mendicula ferruginosa* (bivalve)	54	5.1
3	*Cossura rostrata* (polychaete)	50	4.7
-	Maldanidae spp. indet. (polychaete)	27	2.5
-	Chaetodermamorpha spp. (aplacophoran)	26	2.4
4	*Leptaxinus* cf. *minutus* (bivalve)	25	2.3
5	*Aricidea simplex* - type 2 (polychaete)	24	2.3
6	*Aricidea* sp. 4 (polychaete)	23	2.2
7	*Adontorhina lynnae* (bivalve)	22	2.1
8	*Onuphis* nr. *vibex* (polychaete)	21	2.0
9	*Thyasira flexuosa* (bivalve)	20	1.9
10	*Aricidea* sp. 5 (polychaete)	19	1.8
10	*Chaetozone* sp. 1 (polychaete)	19	1.8
	Total Cumulative (dominant taxa)	524	49.2
	Total Cumulative (remaining taxa)	540	50.8
	Total All 143 Taxa	1064	100

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 17			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Chaetozone* sp. 1 (polychaete)	47	6.6
-	Chaetodermamorpha spp. (aplacophoran)	37	5.2
2	*Aricidea simplex* (polychaete)	32	4.5
3	*Chaetozone spinosa* (polychaete)	26	3.7
3	*Levinsenia flava* (polychaete)	26	3.7
3	*Levinsenia* sp. 3 (polychaete)	26	3.7
4	Nemertea sp. A (*Carinomella*)	21	3.0
5	*Chaetozone* sp. 4 (polychaete)	20	2.8
5	*Prionospio delta* (polychaete)	20	2.8
6	*Janirella* cf. *ornata* (isopod)	17	2.4
-	Maldanidae spp. indet. (polychaete)	17	2.4
7	*Axinopsida* sp. 1 (2002) (bivalve)	16	2.3
8	*Aricidea* sp. 5 (polychaete)	14	2.0
8	*Microclymene* cf. *caudata* (polychaete)	14	2.0
9	*Aphelochaeta* sp. 8 (polychaete)	11	1.5
10	*Aphelochaeta* sp. 1(polychaete)	10	1.4
10	*Pettiboneia brevipalpa* (polychaete)	10	1.4
	Total Cumulative (dominant taxa)	364	51.2
	Total Cumulative (remaining taxa)	347	48.8
	Total All 135 Taxa	711	100.0

SF-DODS Station 19			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
-	Chaetodermamorpha spp. (aplacophoran)	70	14.4
1	*Cossura rostrata* (polychaete)	30	6.2
2	Anarthrurinae sp. 2 (tanaid)	29	6.0
-	Maldanidae spp. indet. (polychaete)	24	4.9
3	*Chaetozone* sp. 4 (polychaete)	20	4.1
4	*Chaetozone spinosa* (polychaete)	18	3.7
5	*Prionospio delta* (polychaete)	15	3.1
6	*Siphonolabrum* sp. 1 (tanaid)	14	2.9
7	*Axinopsida* sp. 1 (2002) (bivalve)	11	2.3
8	*Chaetozone* sp. 1 (polychaete)	10	2.1
8	Nemertea sp. A (*Carinomella*)	10	2.1
9	*Pettiboneia brevipalpa* (polychaete)	9	1.9
10	*Aricidea* sp. 3 (polychaete)	8	1.6
-	Thyasiridae spp. indet. (bivalve)	8	1.6
	Total Cumulative (dominant taxa)	276	56.9
	Total Cumulative (remaining taxa)	209	43.1
	Total All 114 Taxa	485	100.0

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 20			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Levinsenia flava* (polychaete)	58	13.4
-	Chaetodermamorpha spp. (aplacophoran)	42	9.7
-	Maldanidae spp. indet. (polychaete)	21	4.8
2	*Prionospio delta* (polychaete)	19	4.4
3	Nemertea sp. A (*Carinomella*)	15	3.5
4	*Cossura rostrata* (polychaete)	14	3.2
5	*Cossura modica* (polychaete)	13	3.0
6	*Aricidea* sp. 3 (polychaete)	12	2.8
-	Thyasiridae spp. indet. (bivalve)	12	2.8
7	*Prionospio fauchaldi* (polychaete)	9	2.1
8	*Chaetozone spinosa* (polychaete)	8	1.8
8	*Neonotomastus glabrus* (polychaete)	8	1.8
8	Thyasiridae sp. 1 (bivalve)	8	1.8
9	*Chaetozone* sp. 4 (polychaete)	7	1.6
9	*Neoheteromastus lineus* (polychaete)	7	1.6
9	*Pholoe* sp. 1 (polychaete)	7	1.6
10	Anarthrurinae sp. 8 (tanaid)	6	1.4
10	*Ancistrosyllis groenlandica* (polychaete)	6	1.4
10	*Maldane monilata* (polychaete)	6	1.4
10	Nemertea sp. 6	6	1.4
	Total Cumulative (dominant taxa)	284	65.6
	Total Cumulative (remaining taxa)	149	34.4
	Total All 102 Taxa	433	100.0
SF-DODS Station 23			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Levinsenia flava* (polychaete)	63	11.1
-	Chaetodermamorpha spp. (aplacophoran)	54	9.5
2	*Cossura rostrata* (polychaete)	43	7.6
3	*Prionospio delta* (polychaete)	36	6.3
4	*Pettiboneia brevipalpa* (polychaete)	26	4.6
5	Nemertea sp. A (*Carinomella*)	22	3.9
6	*Cossura modica* (polychaete)	17	3.0
7	*Paradoneis lyra* (polychaete)	13	2.3
8	*Aricidea* sp. 3 (polychaete)	11	1.9
8	*Chaetozone* sp. 4 (polychaete)	11	1.9
8	*Chaetozone spinosa* (polychaete)	11	1.9
8	*Haploniscus* sp. 1 (isopod)	11	1.9
9	*Aricidea* sp. 4 (polychaete)	10	1.8
-	Maldanidae spp. indet. (polychaete)	10	1.8
10	Anarthrurinae sp. 1 (tanaid)	9	1.6
10	Anarthrurinae sp. 2 (tanaid)	9	1.6
10	*Braniella* sp. 1 (polychaete)	9	1.6
	Total Cumulative (dominant taxa)	365	64.1
	Total Cumulative (remaining taxa)	204	35.9
	Total All 115 Taxa	569	100.0

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 27			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
-	Chaetodermamorpha spp. (aplacophoran)	54	9.6
1	*Levinsenia flava* (polychaete)	29	5.1
2	*Cossura modica* (polychaete)	27	4.8
3	*Chaetozone* sp. 4 (polychaete)	24	4.3
4	Nemertea sp. A (*Carinomella*)	19	3.4
-	Maldanidae spp. indet. (polychaete)	17	3.0
5	*Ophelina farallonensis* (polychaete)	16	2.8
6	Nemertea sp. 6	15	2.7
7	*Leptaxinus* cf. *minutus* (bivalve)	14	2.5
8	*Aphelochaeta* sp. 1 (polychaete)	13	2.3
8	*Chaetozone spinosa* (polychaete)	13	2.3
8	*Haploniscus* sp. 1 (isopod)	13	2.3
-	Thyasiridae spp. indet. (bivalve)	13	2.3
9	*Aricidea* sp. 3 (polychaete)	12	2.1
9	*Cossura rostrata* (polychaete)	12	2.1
9	*Pettiboneia brevipalpa* (polychaete)	12	2.1
10	*Prionospio delta* (polychaete)	11	2.0
10	*Spiophanes kroyeri* (polychaete)	11	2.0
10	Thyasiridae sp. 1 (bivalve)	11	2.0
	Total Cumulative (listed taxa)	336	59.6
	Total Cumulative (remaining taxa)	228	40.4
	Total All 123 Taxa	564	100.0

SF-DODS Station 50			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Mendicula ferruginosa* (bivalve)	79	6.7
-	Ampharetidae spp. indet. (polychaete)	58	4.9
2	*Cossura rostrata* (polychaete)	49	4.2
3	*Aricidea* sp. 4 (polychaete)	48	4.1
4	*Levinsenia* sp. 5 (polychaete)	43	3.6
-	Cirratulidae spp. indet. (polychaete)	40	3.4
5	*Anobothrus* sp. 3 (polychaete)	27	2.3
-	Chaetodermamorpha spp. (aplacophoran)	27	2.3
5	*Thyasira flexuosa* (bivalve)	27	2.3
6	*Levinsenia flava* (polychaete)	25	2.1
6	*Yoldiella* nr. *minuscula* (bivalve)	25	2.1
7	Hesionidae sp. 2 (polychaete)	24	2.0
7	*Parpano* sp. 1 (amphipod)	24	2.0
8	*Cossura pygodactylata* (polychaete)	22	1.9
9	*Aricidea simplex* (polychaete)	20	1.7
10	*Paralysippe annectens* (polychaete)	19	1.6
	Total Cumulative (dominant taxa)	557	47.2
	Total Cumulative (remaining taxa)	622	52.8
	Total All 172 Taxa	1179	100.0

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 57			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Aricidea simplex* (polychaete)	58	12.5
2	*Aricidea* sp. 4 (polychaete)	16	3.4
2	*Aricidea* sp. 5 (polychaete)	16	3.4
-	Chaetodermamorpha spp. (aplacophoran)	13	2.8
3	*Spiophanes kroyeri* (polychaete)	13	2.8
4	*Adontorhina lynnae* (bivalve)	12	2.6
5	*Cossura modica* (polychaete)	11	2.4
-	Maldanidae spp. indet. (polychaete)	11	2.4
6	*Cossura rostrata* (polychaete)	10	2.2
-	Ampharetidae spp. indet. (polychaete)	9	1.9
7	*Levinsenia flava* (polychaete)	9	1.9
7	*Mendicula ferruginosa* (bivalve)	9	1.9
7	*Notomastus lineatus* (polychaete)	9	1.9
8	*Aphelochaeta* sp. 8 (polychaete)	8	1.7
9	*Chaetozone spinosa* (polychaete)	7	1.5
9	*Clymenura* sp. 1 (polychaete)	7	1.5
9	*Leptaxinus* cf. *minutus* (bivalve)	7	1.5
9	*Maldane monilata* (polychaete)	7	1.5
10	*Desmosoma* sp. 1 (isopod)	6	1.3
10	*Harpiniopsis* sp. 6 (amphipod)	6	1.3
-	Lumbrineridae spp. indet. (polychaete)	6	1.3
10	*Neilonella mexicana* (bivalve)	6	1.3
10	*Paraonella monilaris* (polychaete)	6	1.3
	Total Cumulative (listed taxa)	262	56.5
	Total Cumulative (remaining taxa)	202	43.5
	Total All 126 Taxa	464	100.0

SF-DODS Station 64			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Prionospio delta* (polychaete)	73	13.6
-	Chaetodermamorpha spp. (aplacophoran)	66	12.3
2	*Levinsenia flava* (polychaete)	42	7.8
3	*Chaetozone* sp. 4 (polychaete)	26	4.9
4	*Aricidea* sp. 3 (polychaete)	21	3.9
5	*Saxicavella* sp. 1 (bivalve)	18	3.4
-	Cirratulidae spp. indet. (polychaete)	17	3.2
6	*Mirabilicoxa* sp. 4 (isopod)	14	2.6
7	*Levinsenia* sp. 6 (polychaete)	13	2.4
8	*Prionospio fauchaldi* (polychaete)	12	2.2
9	*Pseudotanais* sp. 3 (tanaid)	10	1.9
10	*Cossura rostrata* (polychaete)	8	1.5
	Total Cumulative (dominant taxa)	320	59.7
	Total Cumulative (remaining taxa)	216	40.3
	Total All 113 Taxa	536	100.0

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 92			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Levinsenia flava* (polychaete)	75	13.7
1	*Prionospio delta* (polychaete)	75	13.7
-	Chaetodermamorpha spp. (aplacophoran)	52	9.5
2	*Chaetozone* sp. 1 (polychaete)	30	5.5
3	Nemertea sp. A (*Carinomella*)	19	3.5
4	*Aricidea* sp. 4 (polychaete)	18	3.3
5	*Cossura rostrata* (polychaete)	17	3.1
6	*Cossura modica* (polychaete)	16	2.9
7	*Neotanais armiger* (tanaid)	15	2.7
8	*Chaetozone* sp. 4 (polychaete)	10	1.8
8	*Chaetozone spinosa* (polychaete)	10	1.8
8	*Sphaerosyllis* sp. 1 (polychaete)	10	1.8
9	Nemertea sp. 6	9	1.6
10	*Haploniscus* sp. 1 (isopod)	8	1.5
10	*Pettiboneia brevipalpa* (polychaete)	8	1.5
	Total Cumulative (listed taxa)	372	67.9
	Total Cumulative (remaining taxa)	176	32.1
	Total All 94 Taxa	548	100.0

SF-DODS Station 114			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
1	*Aricidea simplex* (polychaete)	160	27.1
2	*Levinsenia flava* (polychaete)	37	6.3
3	*Spiophanes kroyeri* (polychaete)	18	3.1
4	*Aricidea* sp. 4 (polychaete)	17	2.9
4	*Thyasira flexuosa* (bivalve)	17	2.9
5	*Notomastus profundus* (polychaete)	14	2.4
-	Thyasiridae spp. indet. (bivalve)	14	2.4
6	*Paralysippe annectens* (polychaete)	13	2.2
7	*Pettiboneia brevipalpa* (polychaete)	11	1.9
8	*Aricidea* sp. 5 (polychaete)	10	1.7
9	*Leptaxinus* cf. *minutus* (bivalve)	9	1.5
10	*Lumbrineris cruzensis* (polychaete)	8	1.4
-	Maldanidae spp. indet. (polychaete)	8	1.4
10	Nemertea sp. A (*Carinomella*)	8	1.4
	Total Cumulative (dominant taxa)	344	58.3
	Total Cumulative (remaining taxa)	246	53.0
	Total All 119 Taxa	590	100.0

APPENDIX E. Dominant taxa at SF-DODS stations sampled in September 2002.

SF-DODS Station 116			
Rank	**Taxon**	**Count (0.1 m^2)**	**Percentage**
-	Chaetodermamorpha spp. (aplacophoran)	86	12.5
1	*Levinsenia flava* (polychaete)	78	11.3
2	*Prionospio delta* (polychaete)	35	5.1
3	*Cossura rostrata* (polychaete)	26	3.8
4	*Axinopsida* sp. 1 (2002) (bivalve)	25	3.6
5	*Haploniscus* sp. 1 (isopod)	24	3.5
6	*Araphura* sp. 2 (tanaid)	22	3.2
6	Nemertea sp. A (*Carinomella*)	22	3.2
7	*Chaetozone* sp. 1 (polychaete)	19	2.8
8	Chaetozone sp. 4 (polychaete)	17	2.5
9	*Pettiboneia brevipalpa* (polychaete)	15	2.2
10	*Cossura modica* (polychaete)	14	2.0
	Total Cumulative (dominant taxa)	383	55.7
	Total Cumulative (remaining taxa)	305	44.3
	Total All 116 Taxa	688	100.0